XUM

TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

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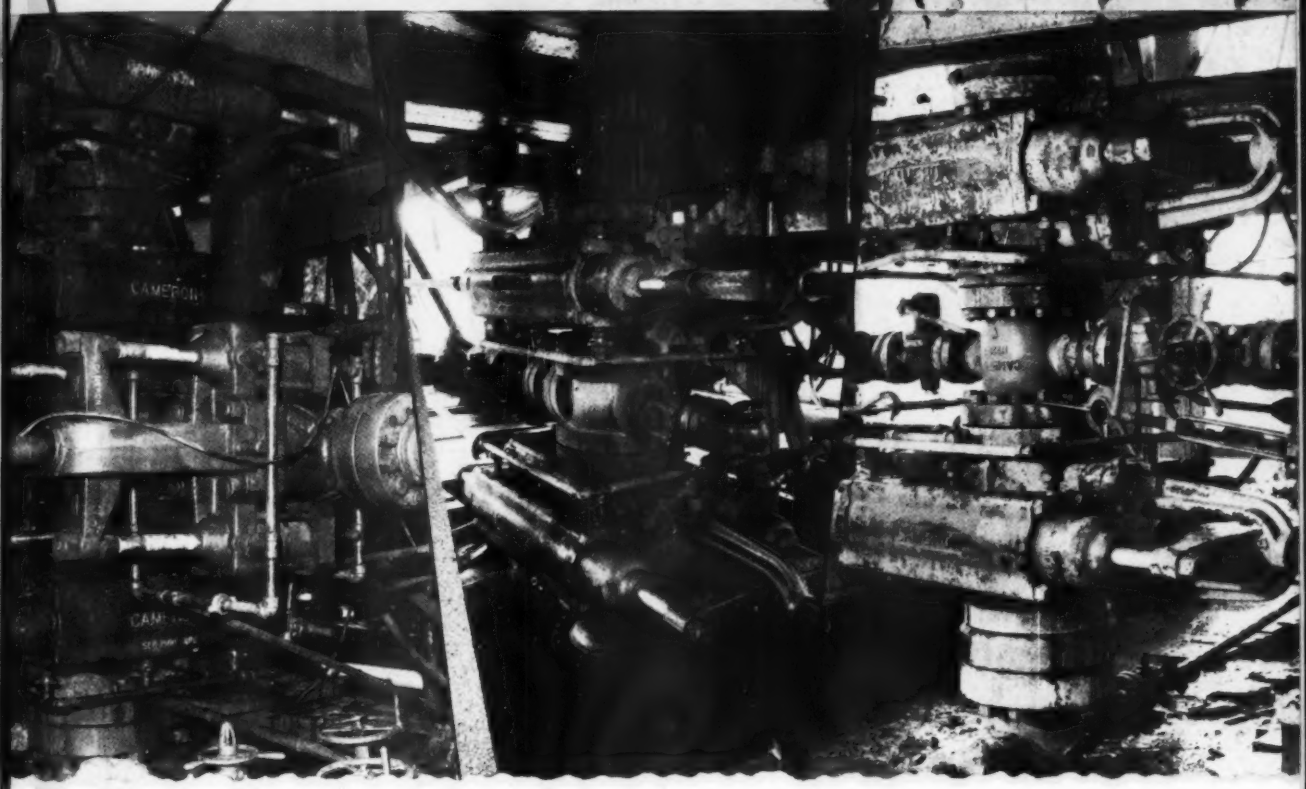

CELLAR VIEWS '51 STYLE

The ratio of blowouts to wells drilled should continue on the downward trend in '51, for more and more operators are replacing their obsolete drilling control units with Cameron QRC Pressure-Operated Blowout Preventers.

No other drilling control unit offers so much protection: Swift closure of rams, remote control operating valves within easy reach of the driller, self-feeding ram packing for a positive seal and to permit pipe rotation through closed rams; high ratio of closing pressure to well pressure (8 to 1), utilization of well pressure in closing rams, and quick ram change design which permits changing of largest size rams in a matter of minutes.

Now is a good time to take stock of your drilling control equipment . . . replace obsolete units with new QRC, to provide maximum protection for your operations.

Cameron 1st name in drilling control

P. O. BOX 1212 • HOUSTON, TEXAS

Export: 74 Trinity Place, New York, N. Y.

PRICE 50 CENTS TABLE OF CONTENTS PAGE 57 ARCH 22, 1951

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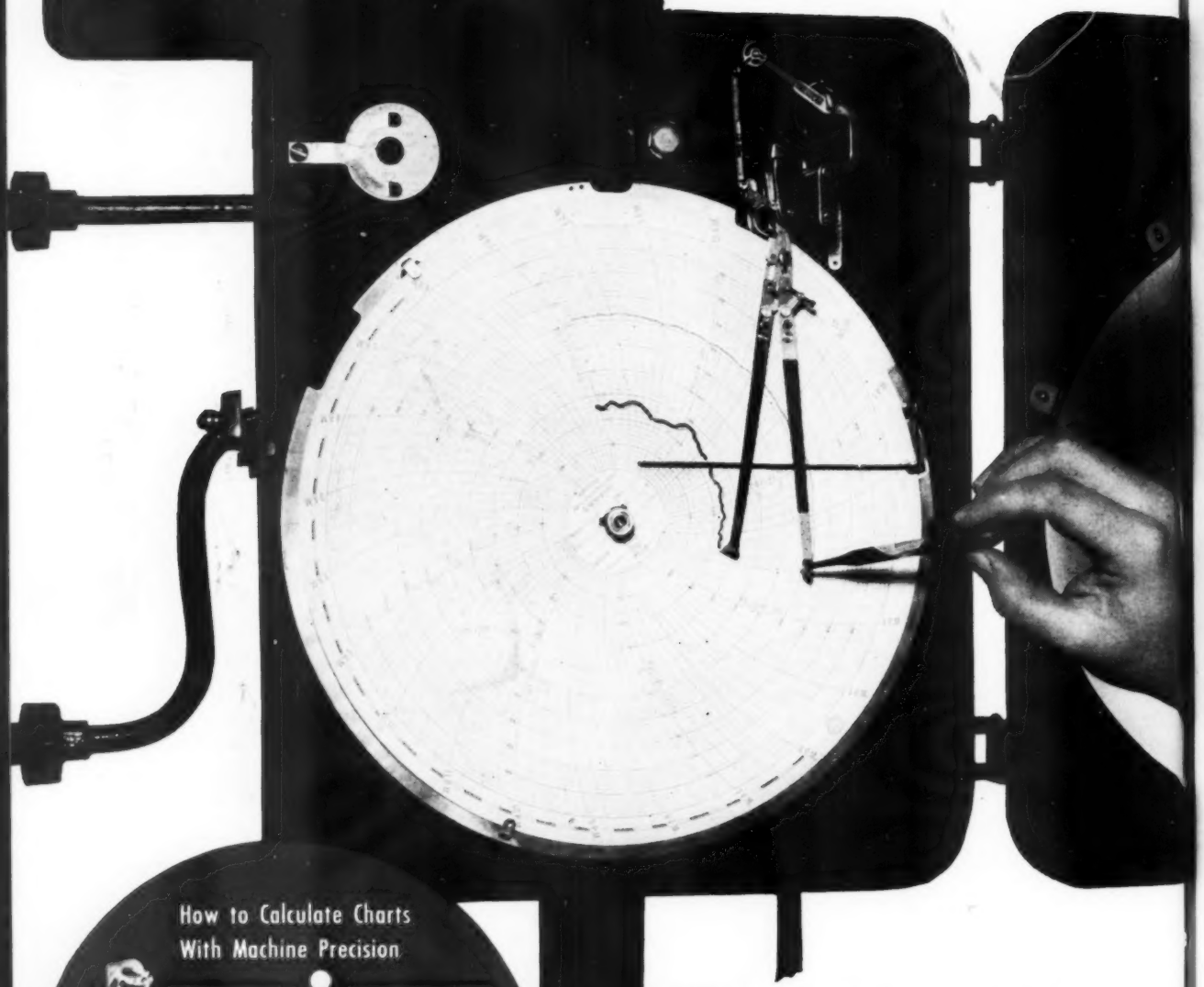
NO BLURRED OR MISSING RECORDS WITH Rockwell-Emco Orifice Meters



How to Calculate Charts With Machine Precision

THE ROCKWELL-EMCO INTEGRATOR

This machine mechanically calculates the extension of various makes of orifice meter charts—up to 300 average charts a day. The extension appears as a total on a straight reading register. The operator traces colored lines over the static and differential records to verify results. Machine will duplicate in the office the accurate record made by the orifice gauge in the field. Write for bulletin 1016.

POSITIVE INKING does the trick

In the Rockwell-Emco design the chart moves in a counter clock wise direction from the underside of the pen to the top. Th direction of movement in combination with a carefully projecte pen angle tends to draw ink from the pens and feed it on the cha at uniform rate of flow. Blurred and missing records are eliminat by this positive method of inking. Here is just another advanta of using Rockwell-Emco orifice meters on all your services. Wr for bulletin 1020.

ROCKWELL MANUFACTURING COMPANY
PITTSBURGH 8, PA.

Atlanta Boston Chicago Columbus Houston Kansas City Los An
New York Pittsburgh San Francisco Seattle Tulsa

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New WALWORTH High Pressure LUBRICANT GUN

Save Time—Save Money. With this simple, rugged portable device, it is possible to save in excess of 50% of the time generally required to lubricate Lubricated Plug Valves. It will economically and efficiently handle the stiffest grades of Walworth lubricants.

The gun is self-priming, may be used in any position, and because of its safety features cannot injure the valve.

High pressure button type grease gun fittings—instead of the lubricant screw which is usually furnished—are available for installation on the valve. By painting the valve a distinguishing color to show the service under which the valve operates, and painting the barrel of the gun with the same color, untrained personnel can lubricate valves with the assurance that the correct lubricant has been used.

Walworth has improved and simplified its lubricants so that with a minimum of nine lubricants it is now possible to handle satisfactorily practically all industrial services. The new Walworth 517 and 514 lubricants will take care of 95% of the service conditions encountered in the handling of Petroleum Products and Gas Pipe Lines. The other seven lubricants will take care of most other petroleum, chemical, and industrial services.

All Walworth lubricants are available in Jumbo stick size, individually wrapped and packed 10 sticks per box. Two Jumbo size sticks will completely fill the barrel of the Walworth Lubricant Gun.

for lubricating lubricated plug valves

WALWORTH

valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

For best results use Walworth Lubricants in Walworth Lubricated Plug Valves.

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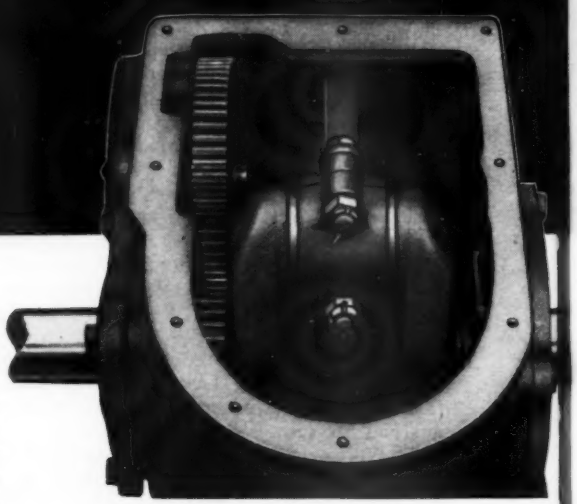
The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951.

the "ZC"

Features Easy Accessibility!

"Maintenance made easy"... that's one of the big reasons why Fairbanks-Morse "ZC" Engines are the oil field favorites. For example, just remove the crankcase cover . . . an easy job in itself . . . and the crankshaft and timing mechanism are exposed for easy inspection and maintenance. There's no need to remove belt guard, loosen the belt, remove the engine from its base—or move the engine in any way. These and the other easy maintenance features of the "ZC" are important points to you . . . in better, lower cost pumping service. Fairbanks, Morse & Co., Chicago 5, Illinois.



Crankcase cover is easily removed to permit quick inspection and maintenance of crankshaft and timing mechanism.

FAIRBANKS-MORSE,

a name worth remembering

"ZC" ENGINES • PUMPS • ELECTRIC MOTORS • LIGHT PLANTS GENERATORS • DIESEL AND DUAL FUEL ENGINES • SCALES

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...Makes the Difference

and GUIBERSON Formation Packers Have It!

You can set it, pull it, re-set it—because Guiberson formation packers have that all-important feature of being easy to pull. They break their positive pack-off and come out clean, without swabbing, when you pull the tubing.

This combination of positive pack-off and easy pulling makes Guiberson formation packers ideal for open hole use in holding gas pressure, testing formations, boosting flowing well production, acidizing, re-pressuring or various work-over operations. Where other packers fail —Guiberson gets the job done!

write TODAY for the 1951 Guiberson catalog!

GUIBERSON FORMATION PACKERS

Type "A" is a single-rubber open-hole formation packer keyed against rotation in all positions.

Type "B" is similar to Type "A" except that a valve is incorporated. Valve is held open by sheer plugs running in; opens automatically when pulling.

Type "C" is a two-rubber packer with more than 50 inches of rubber to assure positive pack-off in even the roughest hole. Valve-equipped.

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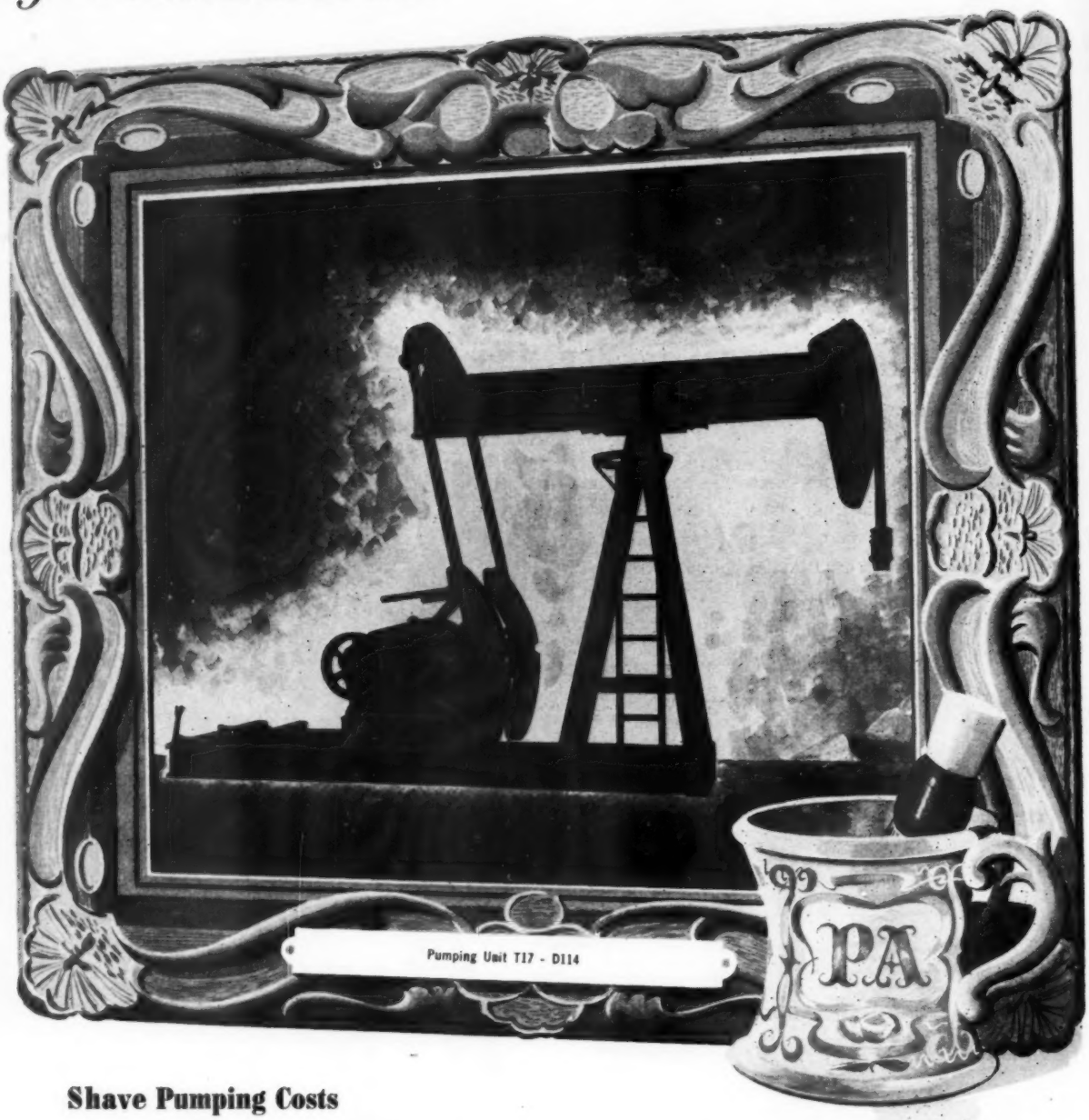
Great AMERICANS



Shave Pumping Costs

with AMERICAN Pumping Units

Available in a complete range of sizes to meet every pumping requirement economically. Write for Catalog 151. Contact your favorite supply store or the nearest American office.

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CORROSION NOW POSES A DOUBLE THREAT

Worn out and corroded equipment may not be replaceable

Don't take chances on vital equipment. Scarce metals and materials are becoming scarcer. Farsighted business men are rebuilding, repairing and *protecting* to insure continuity of their operations.

Do these two things today:

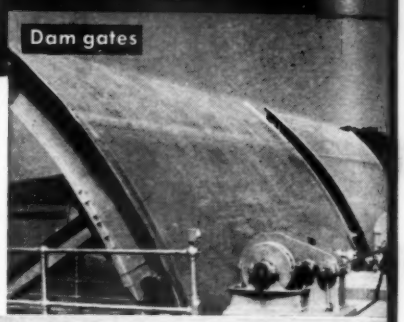
1. Check up in your plant—manufacturing equipment, piping, valves, tanks, motors, and all similar items.
2. Arrange to protect them with Amercoat—the corrosion-resistant coatings; each designed to meet specialized conditions.

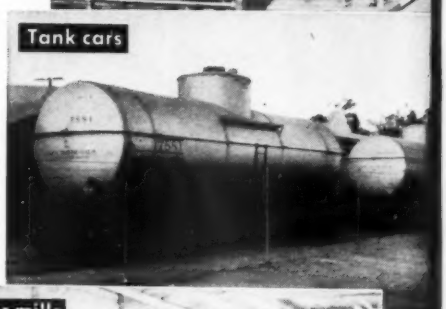
Note: Most conventional coatings fail under severe service conditions. They are neither designed nor suitable for such applications.

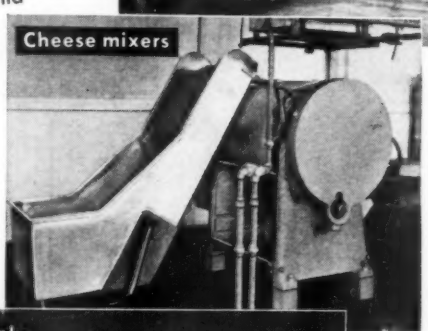
AMERCOAT CORPORATION

A Division of American Pipe and Construction Co.
4809 Firestone Blvd., South Gate, California

FOLLOW THE LINE OF *most* RESISTANCE







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YOUR SUPPLY DEPOT

for

OXYACETYLENE FLAME AND ELECTRIC ARC WELDING AND CUTTING EQUIPMENT AND SUPPLIES

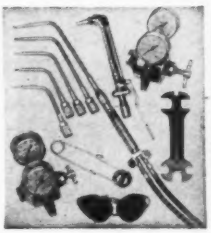
AIRCO GASES AND CARBIDE

Airco Oxygen is produced and tested under the most rigid scientific procedures, and is guaranteed to be 99.5% pure in the cylinder. High purity assures maximum speed and economy in cutting, and greater efficiency in welding.

Airco Acetylene has been proved by use and test to be the most economical fuel gas for pipe welding and other flame welding operations.

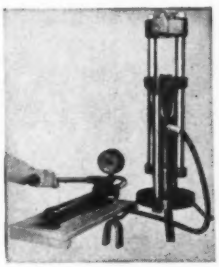
Other Airco gases such as Nitrogen, Hydrogen, Carbon Dioxide and the rare gases Argon, Neon, Helium, Xenon, and Krypton (and mixtures thereof) for commercial and laboratory use are available through a nationwide distribution system. Nitrogen and Oxygen may be also obtained as a liquid and Carbon Dioxide in solid form.

National Carbide (in the red drum) assures the user of a high acetylene yield – better than 4.5 cu. ft. per lb. It is made from the finest available coke and limestone by the most modern manufacturing methods. It is evenly sized and dust-free. Available in five sizes in 25-lb. and 100-lb. drums, 2-lb. and 10-lb. cans.



OXYACETYLENE APPARATUS AND SUPPLIES

Airco No. 846 Welding, Heating and Cutting Outfit. This is the outfit for heavy-duty as well as light and medium day-by-day production welding and occasional cutting. The five tip assemblies will weld metals from the lightest gauge to the heaviest section. Other special purpose tips make possible additional profitable operations such as flame hardening, flame cleaning, silver brazing and the heating of large sections prior to welding. Also included in the outfit are two dual-stage regulators, wrench, goggles, spark lighter, and a special cutting attachment for cutting metals up to 1" thickness.



Airco Tensile and Bend Testing Machine. This machine permits rapid testing of weld specimens in the shop, laboratory, or on field operations. Guided bend tests, transverse tension, and longitudinal all-weld metal tension tests are quickly made with this compact Airco machine.

AIRCO HARDFACING ALLOYS add 2 to 25 times LONGER SERVICE LIFE to worn and new parts

Whatever your wear problem—heat, corrosion, impact or abrasion—Airco's New Hardfacing Alloys will give you the most effective solution. With one application of these wear-retarding materials, the service life of both worn and new parts is increased, in some cases, at least 25 times.

Airco Pipe Cutting and Beveling Machine. This portable flame cutting machine is the fastest, most economical means of preparing pipe for welding. It simultaneously cuts and bevels pipe to any angle. It is chain driven and turns around pipe or remains stationary as pipe is revolved. Airco also has available a full line of other portable and stationary shape and straight line oxyacetylene cutting machines.

ARC WELDING MACHINES, ELECTRODES AND ACCESSORIES

The Wilson "Yellow Jacket" is a ruggedly constructed, gasoline engine-driven generator that has proved ideal for field welding. Features include compactness, improved automatic idling device, close coupling of drive and generator. Made in 300 and 400 amp. sizes. Also available are 200 amp. Wasp and Hornet Specials with air-cooled engines.

The Wilson "Hornet," famous for its smooth, steady arc, easy regulation, and reliable service, is ideal for general purpose DC welding. Made in 200, 300, 400 amp. sizes.

The Wilson "Bumblebee" AC welders (indoor and "All-Weather" models) are supplied in 200, 300, 400 and 500 amp. sizes and other AC units in 750 and 1000 amp. sizes.

A complete line of shielded arc AC and DC electrodes. Airco No. 78E is ideal for DC all-position, general purpose welding where excellent physical qualities are needed. Airco No. 387 is recommended for single or multiple pass DC or AC welding on rusty work and where fit-up is poor. Airco No. 230 is a "top-notch" electrode for all-position AC welding.

Arc Welding accessories include helmets, holders, clamps, gloves, brushes, etc.

★For additional details on any of these products, please contact the nearest Air Reduction Magnolia office.

AIRCO **AIR REDUCTION MAGNOLIA COMPANY**

A Division of Air Reduction Company, Incorporated

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Southwestern Headquarters for Oxygen, Acetylene and Other Gases...Carbide...Gas Welding and Cutting Machines, Apparatus and Supplies...Arc Welders, Electrodes and Accessories

New WHELAND TABLE TOP ROTARY

Model A-17—17½" Through Table · Model A-20—20½" Through Table

FACTORY "RUN-IN"

RUGGED

QUIE

PRECISION BU

EASY TO MAINTA

HIGH SPEED, OIL BATH ROTARY WITH RAISED GUARD FOR SAFETY

NEW FEATURE

A recent modification on the New Wheland Table Top Rotary now provides eight sturdy built-in holds, one on each corner, to make this one of the world's easiest rotaries to pick up and move.

PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

CUTS RIGGING UP TIME

BASE: Fabricated steel plate with cast steel center. Derrick floor easily fitted to box shape. Pipe can be stacked on top surface. Safe! Steel guard raised 1¾" above revolving table.

TABLE: Steel casting rotates on precision ball bearings in hardened and ground races that take both radial and thrust loads.

BRONZE TABLE BUSHING: Alemite lubricated. Prevents scoring of table.

GEAR AND PINION: Gleason spiral gear and pinion, standard equipment. Gears are shock resistant and perfectly lubricated to run smoothly, quietly.

PINION SHAFT ASSEMBLY: Removable as a unit for easy maintenance. Shaft is forged steel, precision machined, mounted on Timken bearings. Pinion locked at factory in perfect alignment with main gear for long trouble-free operation.

INBOARD AND OUTBOARD PINION SHAFT SEALS: In addition to new, improved mechanical seal, a positive type rubbing seal excludes all grit, sand, etc., from outboard bearing.

SUPERIOR LUBRICATION: Proper grade lubricant for each part assured by three separate, securely sealed oil compartments. Fill and check from top. Three separate oil pipes with bell reducers make it easy to add oil, separate automobile type dip sticks for checking oil level.

LOCKING DEVICE: Locking device is simple, positive. Engages ring gear, eliminates shock from pinion, shaft and bearing. Lock handle on top of table, convenient to driller.

SPLIT MASTER BUSHING: Cast steel. Takes A.P.I. Standard drive bushings. Master bushing alone or both master and drive bushings can be locked to table.

FULL MECHANICAL DETAILS ON REQUEST

WHELAND

THE WHELAND COMPANY, CHATTANOOGA, TENN., U. S. A.

ROTARY DRILLING MACHINERY

DRAWWORKS • SLUSH PUM
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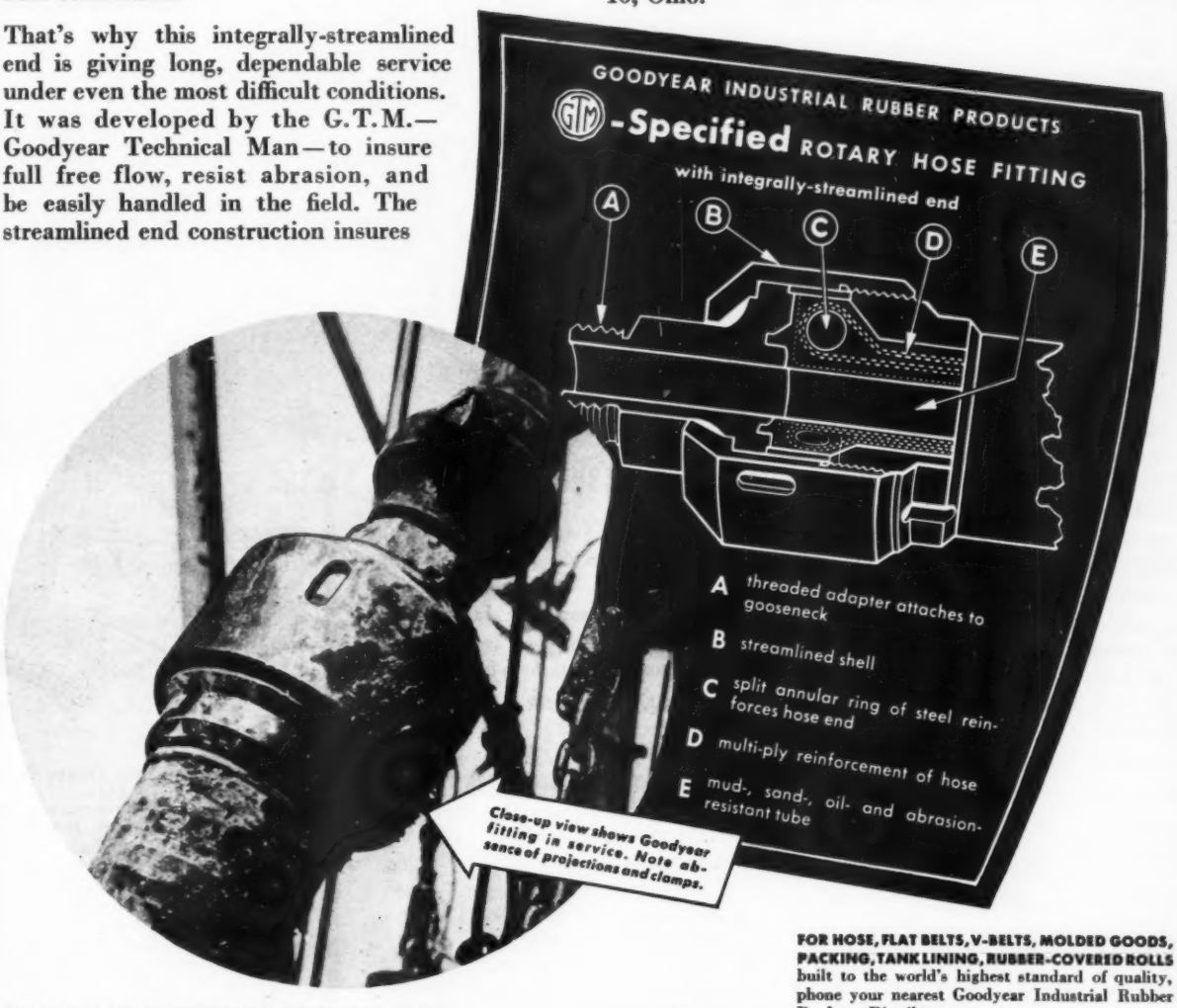
Full Flow-*easy handling*-

with the Exclusive Goodyear Rotary Hose Fitting

THE streamlined, factory-built-in fitting you see here was developed by Goodyear to meet oil field specifications for a truly trouble-free rotary hose connection.

That's why this integrally-streamlined end is giving long, dependable service under even the most difficult conditions. It was developed by the G.T.M.—Goodyear Technical Man—to insure full free flow, resist abrasion, and be easily handled in the field. The streamlined end construction insures uniform strength and flow, along the entire length of the hose, elimination of enlarged ends and outside clamps that catch on the rig to cause costly jams at the head end.

Ask the G.T.M. for details, see your nearest Goodyear Distributor, or write Goodyear, Akron 16, Ohio.


GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GTM-Specified ROTARY HOSE FITTING
with integrally-streamlined end
A
B
C
D
E
A threaded adapter attaches to gooseneck
B streamlined shell
C split annular ring of steel reinforces hose end
D multi-ply reinforcement of hose
E mud-, sand-, oil- and abrasion-resistant tube
Close-up view shows Goodyear fitting in service. Note absence of projections and clamps.

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FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

GOODYEAR

THE GREATEST NAME IN RUBBER

"CAT" BULLDOZER...

America's all-purpose tool!

Building road to the drilling site of the Republic Natural Gas Co., near Corpus Christi, Texas, this "Caterpillar" D4 Tractor with matching blade handles a variety of tough jobs to keep this operation in high gear. "Caterpillar" Bulldozers are made in a variety of sizes, with each matched package built for specific job-load chores. With a "Cat" 'Dozer you get a rugged tool made by the same manufacturer who produces the machines that dig the slush pits and the drill sites. Standardize for best results. . . . Price of a standard "Caterpillar" D4 Tractor is $5,200; No. 4S Bulldozer, $1,325; No. 44 Hydraulic Control, $480, f.o.b. Peoria. Prices subject to change without notice.

"CATERPILLAR" track-type Tractors and matching Bulldozers are an oilfield team with a power punch. They thrive on the toughest assignments. Here a "Cat" D4 Tractor with No. 4S 'Dozer builds a road to the drill site and protects it with a 'dozer-built dike for the Republic Natural Gas Co. near Corpus Christi, Texas. In muddy going it tows trucks—earns its keep by tackling a dozen other chores to keep production up and other equipment working at peak performance.

"Caterpillar" Bulldozers give you matched design—tractor and 'dozer built to work together. This rugged team is a bear at meeting work schedules. Sturdy construction and quality materials enable it to keep punching full time without time out for tinkering, and the special steel cutting edge of the blade hammers through the toughest going. Most important of all, the precision methods used in "Caterpillar" factories build extra years of life into these highly maneuverable tools.

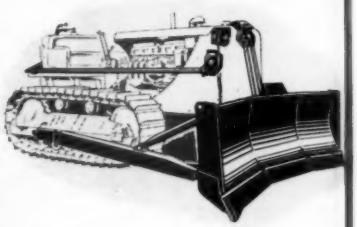
For help with your equipment problems, see your "Caterpillar" dealer *now*. Today's expanding military program has high priority. But it is recognized that our national preparedness depends upon stepped-up civilian production too. So your "Caterpillar" dealer is especially interested in meeting your needs—through equipment replacement and by exercising his working partnership with you to keep the machinery you have *on the job*.

CATERPILLAR, PEORIA, ILLINOIS

• • •

"CATERPILLAR" BULLDOZER EXTRA FEATURES

1. Tractor and 'dozer *broken to harness*, and a size for every need.
2. Moldboard curvature for active, *rolling*, higher production loads.
3. Box section side arms—extra thick at points of greatest stress.
4. Choice of straight or angling type of blade, simple to maneuver and easy to adjust or detach.
5. Your choice of hydraulic or cable controls.
6. The power of the "Caterpillar" Diesel Engine is geared to blade *capacity*.



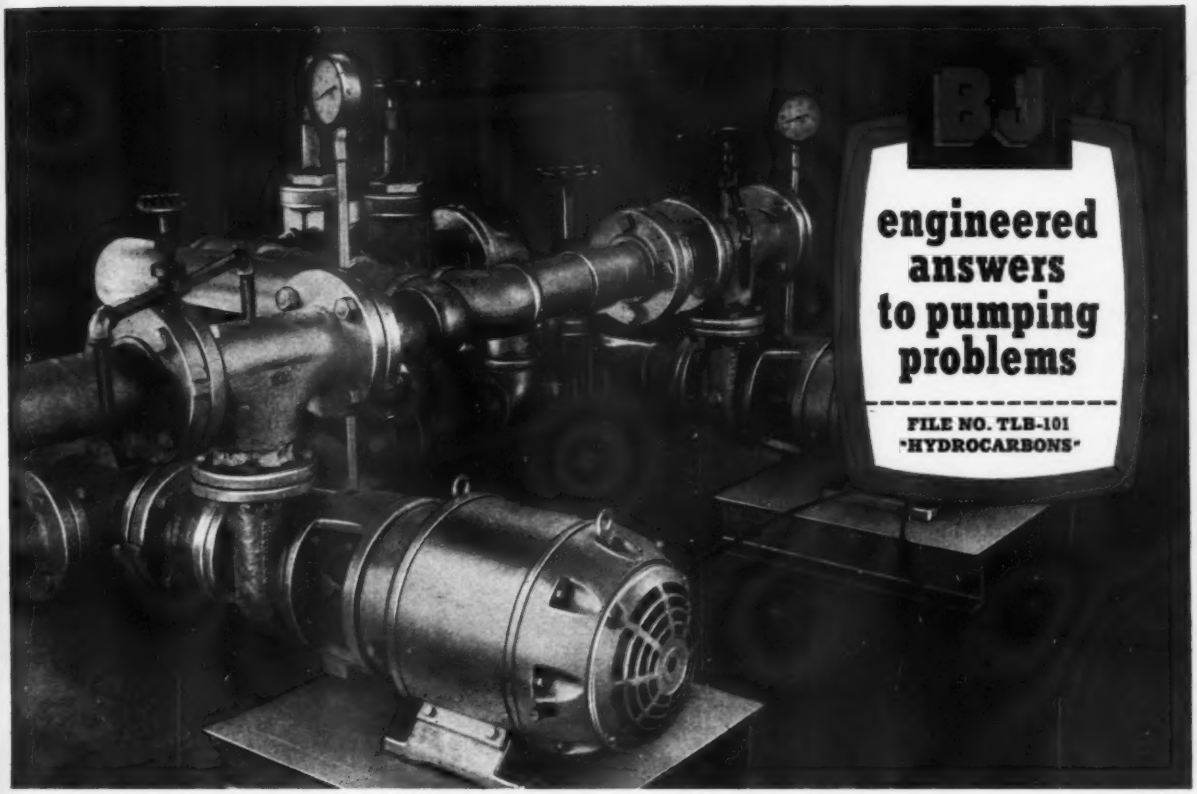
New Addition to 'Dozer Line

Here's a specialist that can step up production and cut costs. It's the brand new No. 8U 'Dozer for use with the "Caterpillar" D8 Tractor, with cable control. Working best in loose or light material, the end portion of this blade extends forward to give it a flat U shape. This enables it to drift large loads longer distances without spillage for bigger production. The No. 8U is built to the same high standards of strength and long life as the other "Caterpillar" Bulldozers. The versatility of this new tool gives it excellent performance on all kinds of 'dozing jobs, from stockpiling to pioneering.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



General Petroleum reports:

Mechanically-sealed BJ Type TLB Pumps handle hydrocarbons without leakage, fire hazard, repacking problems or special operating attention

BYRON JACKSON ENGINEERS developed the TLB pump to solve the leakage, fire hazard and repacking problems faced in the handling of hydrocarbons. Formerly, the only pumps which met these requirements represented a considerable investment in cost and installation. Now, the BJ Type TLB offers a sensibly-priced unit, easily installed and operated with a minimum of attention. It features a simple, efficient BJ Mechanical Seal which replaces the packing in the stuffingbox and provides a reliable safeguard against leakage.

The installation shown above is at General Petroleum's Bakersfield Bulk Plant. Two BJ Type TLB Pumps are used here for loading gasoline and diesel fuels, pumping 160 gpm against 62 ft. total head. Explosion-proof 3 hp, 3-phase, 60 cycle, 220/440 v motors operate at 3550 rpm.

For the engineered answer to *your* standard or special pumping needs contact your local BJ sales office or write direct. For more information on these TLB Pumps —including pump selection table and friction compensation charts—send the coupon below.

FILE FACTS:

- Shrouded design simplifies installation—needs no base plate—saves space—mounts at any angle.
- No packing to maintain.
- BJ Mechanical Seal cooled by pumped liquid.
- Single-stage, single-suction pump sizes from 1¼" to 4".
- Close-coupled construction allows more efficient application of power to pump.
- Capacities to 1000 gpm. Heads to 200 ft.
- Discharge pressure: 75 psi.
- Max. working temperatures: 180°F.
- Explosion-proof motors.

Byron Jackson Co.
Since 1872
P.O. Box 2017, Terminal Annex, Los Angeles 54, Calif.

PUMP DIVISION, Dept. 26
Please send me your TLB Bulletin No. 50-9200

Name_____

Company_____

Address_____

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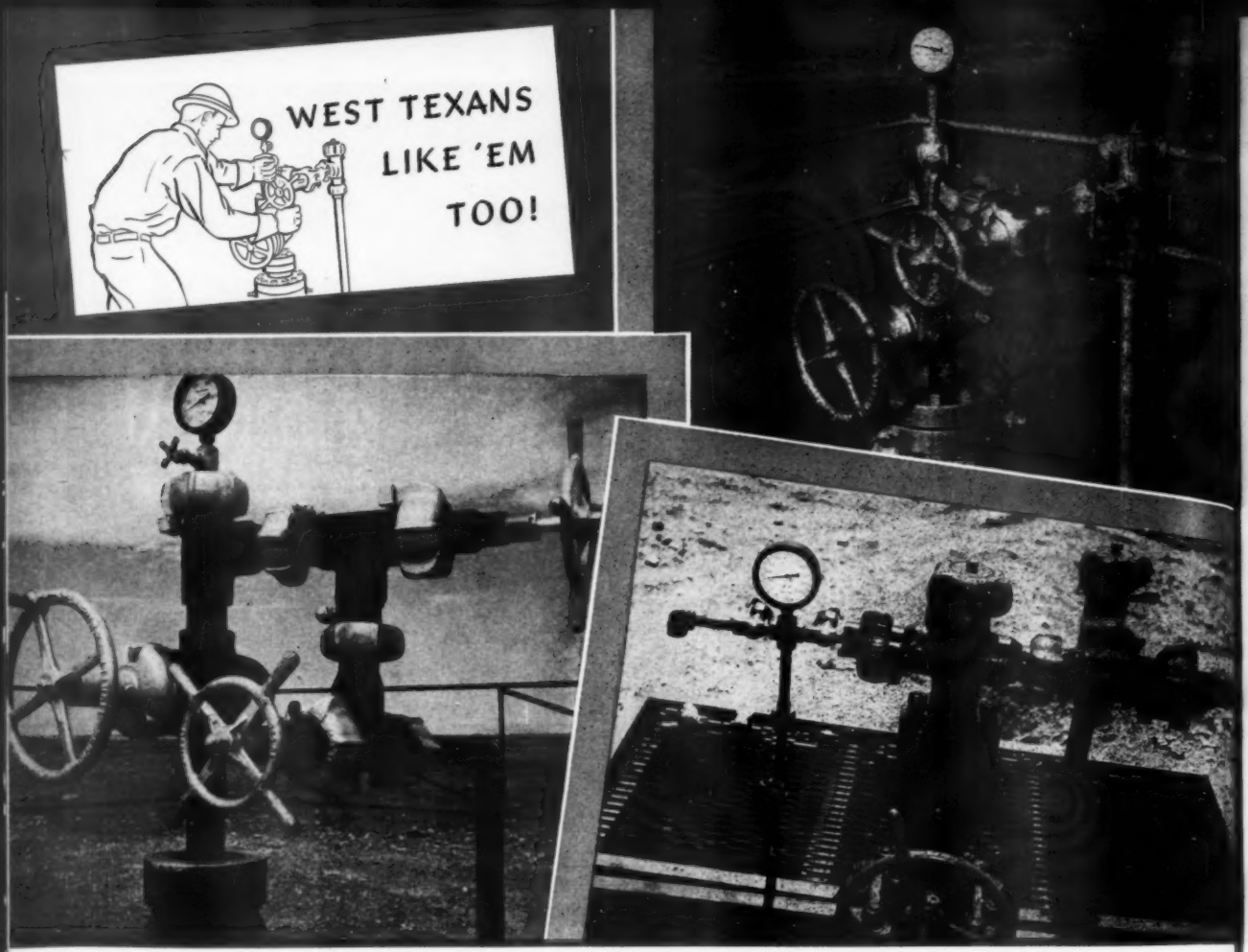
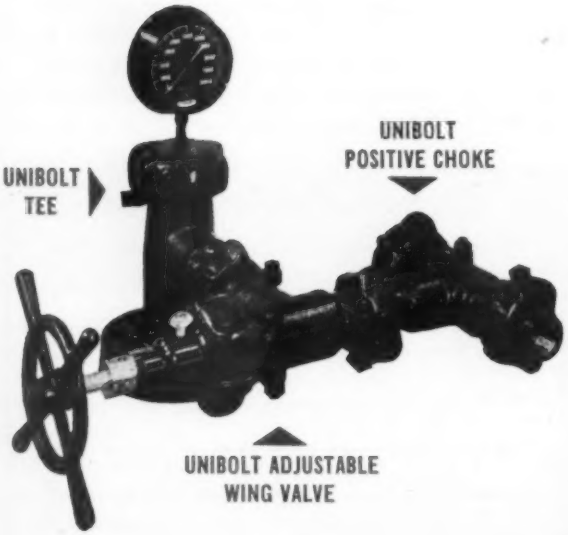


Views from Scurry, County, Texas

UNIBOLT *Flow Manifolds*



More and more operators are requesting their Christmas tree supplier to furnish UNIBOLT Flow Manifolds because they are lighter in weight, stronger, and more economical, and easier to maintain than ordinary flanged Christmas tree wings.

Employing standard UNIBOLT connections rather than flanges, the UNIBOLT Flow Manifold is many pounds lighter, yet the UNIBOLT design, which places more steel in shear, actually results in a higher factor of safety for the manifold.

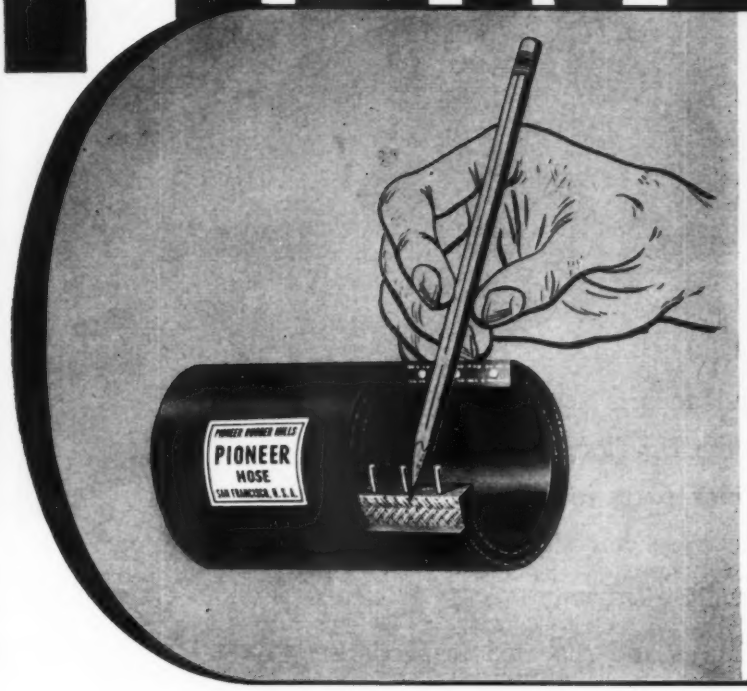
The units of the manifold — UNIBOLT Tee or Cross, Adjustable Wing Valve, and Positive Choke Body — are pressure-tested as a unit and may be assembled in a number of combinations to best meet individual needs. They are furnished in regular forged steel or in high-chrome alloy for corrosive wells — 6,000, 10,000 and 15,000 lbs. test. The manifold is completely salvageable.

Any desired volume of well flow may be accurately produced with UNIBOLT Flow-Rated Beans, which are available in flow increments of 5% and 10%, or in standard fractionally drilled sizes. See your Composite Catalog for complete details or write for literature.

THORNHILL-CRAVER COMPANY UNIBOLT HOUSTON, TEXAS

Industrial rubber products especially built for LONG SERVICE

PIONEER



Announcement to you who buy industrial rubber goods with care

Growing demand for PIONEER industrial rubber goods in the Southwest States has led to the establishment of a PIONEER RUBBER MILLS FACTORY BRANCH at Dallas, Texas. We are glad to announce that this branch will be under the direction of Mr. O. D. Upton, who with other men in the organization, has virtually grown up with industry in Texas and the surrounding states. This message should be particularly significant to those buyers who believe, as we do, that it is now more important than ever to emphasize long life and better performance in hose, belting, and other industrial rubber products.

We invite your inquiries on these PIONEER products, all of which have been built to extremely high standards for a period of sixty-three years. PIONEER RUBBER MILLS can supply every type of standard or special construction used by Southwest industry.

PIONEER RUBBER MILLS

FACTORY BRANCH:
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UNIT RIG SERVICE PARTS . . . ALWAYS FIT

Unit Rig has never had a parts replacement job that couldn't be done on the rig floor! Old parts may be removed and new parts installed right on the rig floor, because there are no press nor shrink fits that require special equipment.

Extremely close machine tolerances and repeated inspections assure quick and easy fitting without filing, grinding, welding or re-machining.

Prompt delivery of *parts that fit* is one more reason why you save time and money when you own Unit Rig equipment. Make your next drawworks a Unit Rig.

UNIT RIG & EQUIPMENT CO. TULSA, OKLAHOMA U.S.A.

DESIGNED FOR THE JOB....

UR-512

UNIT RIG DRAWWORKS ARE SOLD EXCLUSIVELY THROUGH THESE AUTHORIZED DISTRIBUTORS

BOVAIRD SUPPLY COMPANY
HOUSTON OIL FIELD MATERIAL COMPANY
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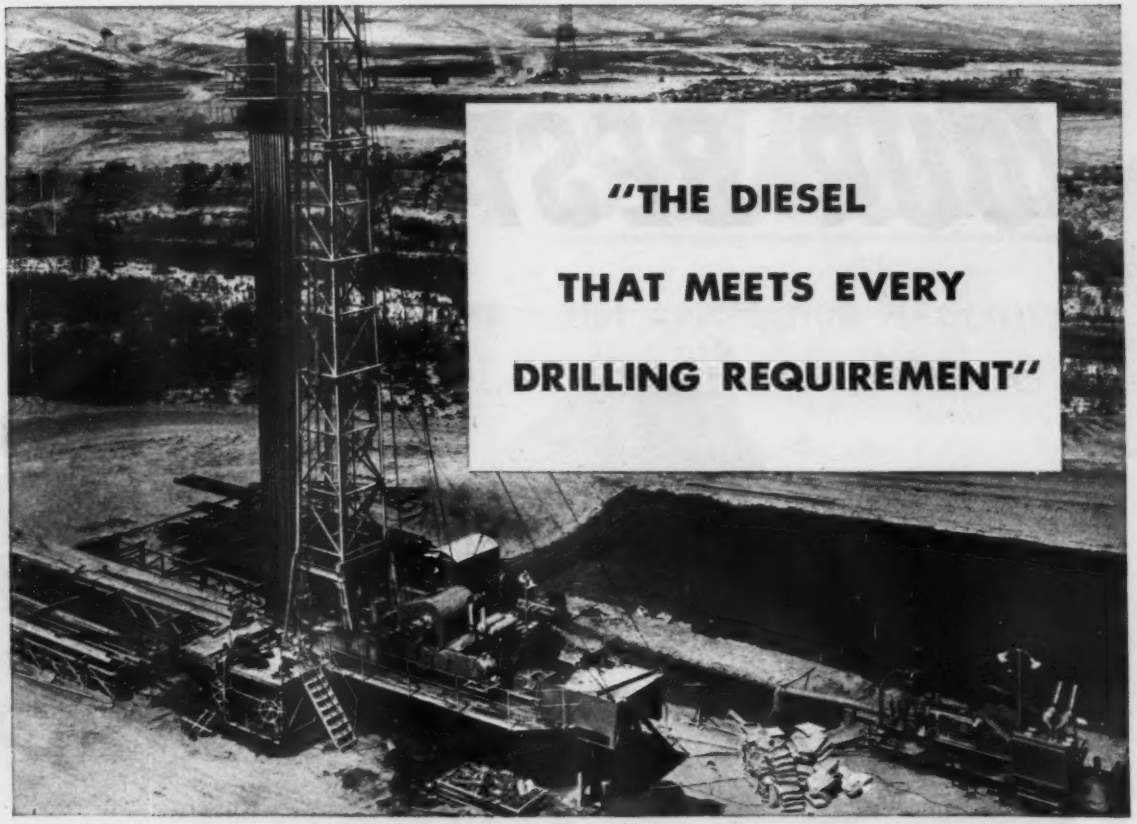
MID-CONTINENT SUPPLY COMPANY
NORVELL-WILDER SUPPLY COMPANY
OIL WELL SUPPLY COMPANY

EXPORT SALES — MID-CONTINENT SUPPLY COMPANY, 42 Broadway, New York City. Cable — MIDUNITRIG

XUM



Three GM Series 71 Diesel Twin Sixes, with integral torque converters, drive Ideco drawworks and mud pumps.

OIL well drilling contractor M. H. Stansbury, of Bakersfield, California (who has been drilling in California fields since 1935), writes as follows:

> "The GM Diesel engine is of the right size, sufficient horsepower and all-around characteristics to meet the severe requirements of oil well drilling. Also the immediate availability of repair parts and service is highly important to this business."

Two-cycle operation, with power at every piston downstroke, gives GM Diesel engines more power in fewer units that weigh less and take up less space. GM's exclusive system of direct fuel injection—with easily replaceable unit injectors—insures cleaner, more accurately controlled combustion and eliminates troublesome high-pressure fuel lines. The same basic design is used in all Series 71 engines from 2-cylinder single to 24-cylinder multiple units. This assures high parts interchangeability and low-cost maintenance. And these engines are backed by General Motors' world-wide service facilities.

Before you buy new equipment or repower old, it will pay you to get all the facts about GM Series 71 and 6-110 Diesel engines and the new GM Diesel Torque Converter units. *Write, wire or phone for details.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... *Up to 275 H.P.* **DETROIT 28, MICHIGAN** MULTIPLE UNITS... *Up to 800 H.P.*

GENERAL MOTORS

GM GENERAL MOTORS DIESEL POWER

DIESEL BRAWN WITHOUT THE BULK

GENERAL MOTORS CORP., DIESEL ENGINE SALES, PETROLEUM INDUSTRY, 1504 Philtower Bldg., TULSA 3, OKLAHOMA

CALIFORNIA: Anderson-O'Brien Co., LOS ANGELES 21; Lawless Brothers, BAKERSFIELD; West Coast Engine & Equipt. Co., BERKELEY. **ILLINOIS:** Western Machinery & Engine Co., CENTRALIA. **KANSAS:** Diesel Equipment Co., Inc., WICHITA. **COLORADO:** Colorado Builders' Supply Co. (Equipt. Division), DENVER. **LOUISIANA:** George Engine Co., Inc., HARVEY; United Tool Company, SHREVEPORT. **MISSISSIPPI:** Taylor Machine Works, JACKSON. **MISSOURI:** Western Machinery & Engine Co., ST. LOUIS 10. **MONTANA:** Seitz Machinery Co., Inc., BILLINGS; Mountain Tractor Co., MISSOULA. **OKLAHOMA:** Diesel Power Co., OKLAHOMA CITY. **TEXAS:** Stewart & Stevenson Services, Inc., HOUSTON 1, McALLEN, DALLAS, CORPUS CHRISTI, WICHITA FALLS; Haynes Machinery Co., PLAINVIEW; Empire Machinery Co., Ltd., ODESSA. **WYOMING:** Colorado Builders' Supply Co. (Equipt. Division), CASPER.

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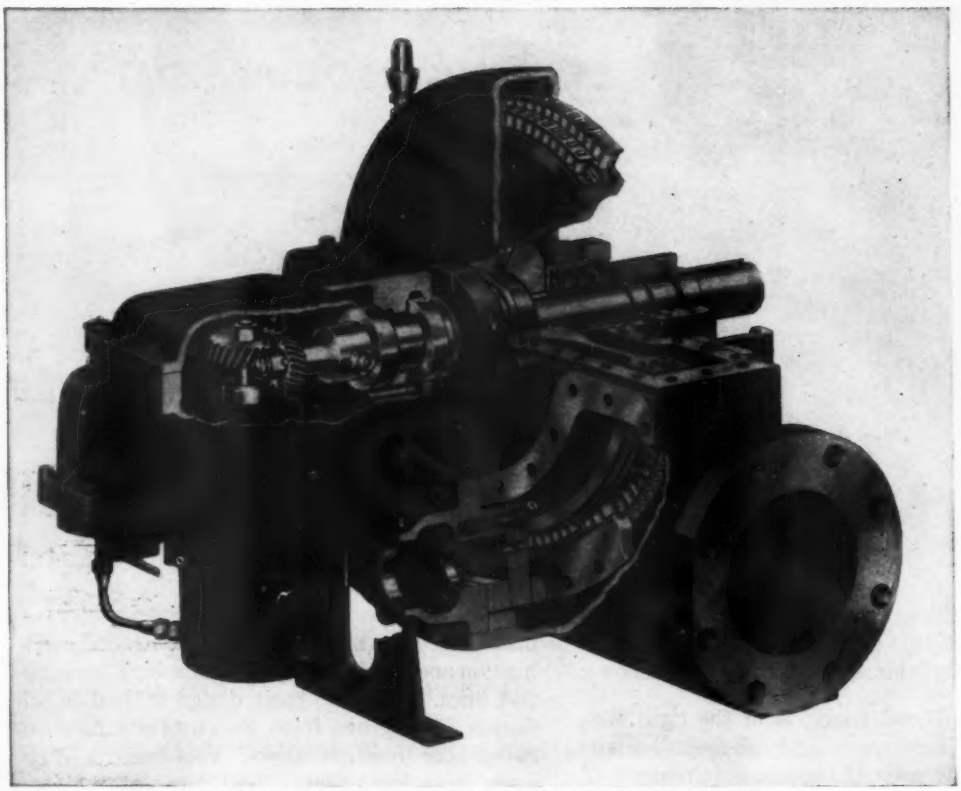
Now More Than Ever . . .

YOUR BEST TURBINE



DP single-stage turbines are rated from 10 to 1200 hp, 1000 to 5000 rpm

Type DP

Since the introduction of the DP turbine, more than two years ago, General Electric has been telling mechanical-drive turbine users that their best turbine buy was a *standard* design, wherever it could be properly applied. Nowadays, with the emphasis on increased output, the advantages which turbine standardization offers are even more important.

Standardization means that turbines of different rating and size have mostly identical construction features. This speeds delivery, cuts manufacturing costs, makes possible a better design and a better turbine. If you're not familiar with the General Electric DP, we suggest that you contact your nearest G-E sales office or send for a copy of bulletin GEA-4955, "A New Standard in Mechanical Drive Turbines." Write to *Apparatus Dept., General Electric Company, Schenectady, N. Y.*

GREATER RELIABILITY

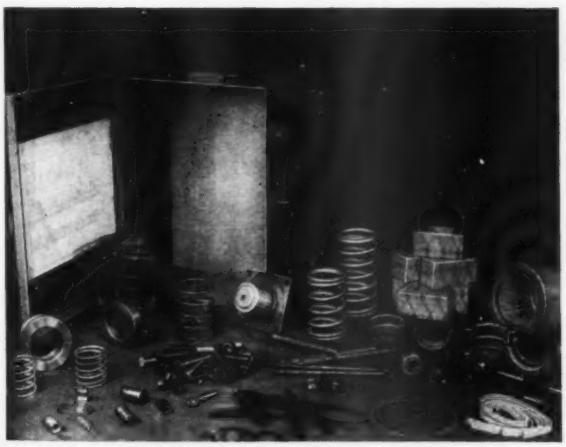
From its totally enclosed governor to its durable babbitt-faced bearings, General Electric's DP turbine is built to provide greater productivity through greater reliability. Standardization has made possible "extras" such as pressure lubrication, Monel-sprayed shaft, self-positioning packings, a totally enclosed hydraulic governor. You can count on your DP for safe, dependable service in hazardous atmospheres and on tough, continuous-process assignments.

DRIVE IS A STANDARD

This DP drives a centrifugal pump in a refinery

WIDE APPLICATION FLEXIBILITY

In plants which require shifting of equipment from job to job, a standard DP frequently eliminates the need for extra drives. Because most parts are identical for all ratings, speed range and shaft horsepower can be easily and economically changed to fit new conditions. Though the DP's 30% adjustable speed range is usually adequate, a new range can be set anywhere from 800 to 5000 rpm simply by substituting a new emergency governor and governor gears. A change in horsepower rating usually requires a new nozzle plate and a few valve parts. These parts are all available on immediate delivery and save the expense of a new turbine which would be required with a less flexible, non-standard unit.



Standard spare parts kits are available with all DP turbines

EASIER, QUICKER MAINTENANCE

Because most parts of standard DP's are interchangeable on all models, spares can be easily stocked, and maintenance work handled quicker. You can have delivered with the turbine a 91-item spare parts kit, sufficient to service several machines. Socket-head cap screws are used throughout for quick disassembly. Standard shaft height, keyways, and coupling fits simplify installation. You can move DP's from job to job without change in the base structure.

GENERAL ELECTRIC

252-49

Mud ain't no baked potato!

Salt don't help it any...

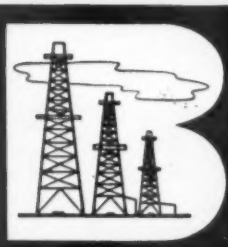
These Baroid Products Combat Salt

BAROCO
Operators find this inexpensive, salt-resistant high yield drilling clay ideal for use in drilling fluids exposed to moderate salt contamination.

BAROID EMULSION MUD. An oil emulsion drilling fluid of exceptional stability, excellent lubricating properties and easily controlled viscosity, gel and water-loss characteristics. Salt and other contaminants do not affect the oil emulsion drilling fluid when it is properly compounded.

IMPERMEX
This organic colloid provides drilling fluids of exceptionally low water-loss, regardless of the salt concentration.

ZEOGEL
This special clay gives stable drilling fluids no matter how high the salt concentration. Addition of Impermex will provide low water-loss characteristics to the mud.



Baroid

BAROID SALES DIVISION
NATIONAL LEAD COMPANY
LOS ANGELES · TULSA · HOUSTON

Complete Drilling Mud Service

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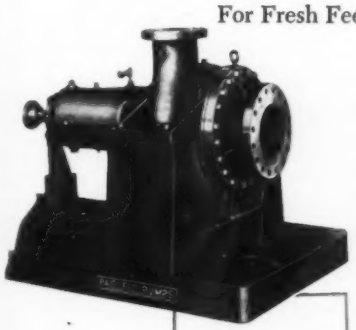
RECORD BREAKING PERFORMANCE PROVED

Pacific

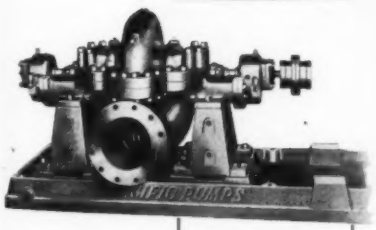
Precision Built PUMPS

WERE SELECTED FOR THE WORLD'S LARGEST "CAT"*

For Fresh Feed • Hot Bottoms • Hot Reflux • Slurry Reflux • Recycle • Decanted Oil

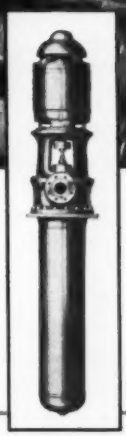


TYPE **SV** SLURRY



TYPES **DH-KH**

TYPE **SVC**



TYPE **WY**

Pacific Pumps are serving "cats" the world over. Because they are Precision Built from materials selected for the specific service. They have established the most outstanding records for continuity of operation with sustained economy.

- Light and Heavy Gas Oils
- Recycle—Reflux
- Stripper Bottoms
- Debutanizer Feed —Reflux
- Depropanizer Feed —Reflux
- Boiler Feed
- Surface Condenser Condensate

WRITE FOR BULLETINS

**Name on request*

PACIFIC *Precision Built* **PUMPS**

PR-12

Pacific Pumps inc.

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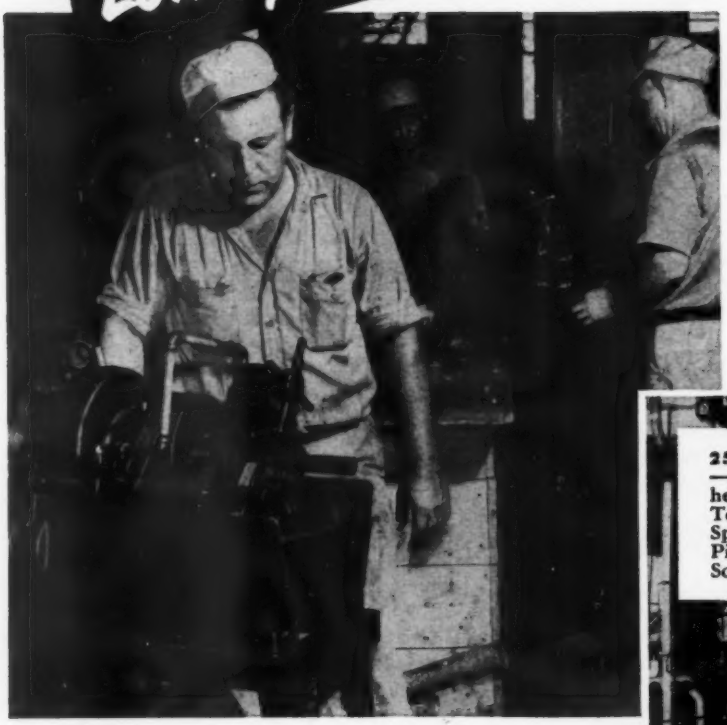
"Long life... Low upkeep!" ...say users of TOLEDO 2" Portable Power Pipe Machines



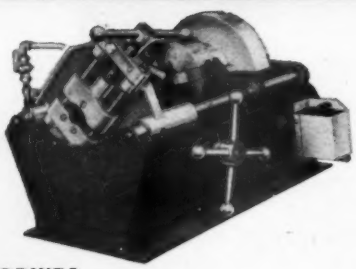
20 YEARS! "These two Toledo #999 Machines have been in continuous hard service for more than 20 years with only routine service attention," says P. E. Hayes of J. M. Hengy Electric Co., Dallas, Texas. "All our pipe threading tools, both power and hand, are and will be Toledo." Photo taken on Dallas Power and Light Co. job.

25 MACHINES! Tooled for high production—Farwell Company, Inc., plumbing and heating contractors in Dallas, Texas, have 15 Toledo #999 Machines, 5 Toledo 2" High Speed Machines and 5 Toledo #1-2-4 Power Pipe Machines. Photo shows work on Southern Methodist University job.

Speed Production . . .

It's *5 times faster than hand methods*—this rugged-performing TOLEDO No. 999 2" Power Pipe Machine! Job-proved by thousands of users—progressive outfits like the Texas contractors described above. A machine that's *right* for your high-production needs today!

Threads 2" pipe in 22 seconds . . . cuts off 2" pipe in 10 seconds. Compact . . . portable . . . efficient . . . use it anywhere in your shop, plant or on the job. Your choice—Wheel or Knife Cut-Off. Toledo-built with the know-how of nearly 50 years . . . assuring *long life . . . low upkeep.* Write for catalog. The Toledo Pipe Threading Machine Co., Toledo, Ohio. New York Office: 165 Broadway, Room 1310.



RELY ON THE LEADER **TOLEDO**

PIPE TOOLS...POWER PIPE MACHINES...POWER DRIVES

PB's PROTECTOR INSTALLATION METHOD is the FASTEST, SIMPLEST, EASIEST, SAFEST IN THE FIELD

It eliminates breaking joints in a stand to install protectors. New protectors are installed at any joint in the stand, either going in or coming out of the hole.

For full details, call

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Houma, La.	1689R
Mooringsport, La.	3871
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BLACK MAGIC

OIL BASE DRILLING FLUID

drastically reduces mud costs in one of the deepest wells ever drilled

Reported recently in World Oil, a deep test well in the Gulf area using diamond bits and **BLACK MAGIC,** is setting an amazing record—not only for depth—but in the low maintenance cost of the drilling mud. In the words of Elton Sterrett, Engineering Editor of World Oil, this is how it is being done:

For complete information, write for a reprint of the World Oil article.

"The original drilling program called for water base mud, this fluid also being used for the first diamond coring schedule. It was found that the time to recondition the mud in the bottom of the hole—with a temperature of 320°F. or more—required from 12 to 16 hours before the mud was in shape to permit actual drilling. At a total depth of 14,670 feet . . . the water base mud was displaced with an oil-base premixed mud. The bulk requirement of the system was then 685 barrels."*

The core barrels had a capacity of 30 feet, so 27 feet of core was cut and the string pulled for core recovery. *"Practically 100 percent core recovery has been the rule,"* Starrett continues, *"and up to the latest report, no rig time had been charged to mud conditioning. When making a round trip, it is customary to come out of the hole without previously conditioning the mud, and to put the bit on bottom again and resume drilling without conditioning or loss of time. The only weight material added is a few sacks to slug the pipe before making a trip. Not only was it unnecessary to recondition the hole after round trips, but it was also found that drilling could be resumed after leaving the bit on bottom for periods of from a few minutes to several hours, without trouble from mud viscosity change or settling out of the cuttings. These periods of bit idleness occurred when pump repairs were required or when it was necessary to take one or more of the battery of boilers out of service for workover.*

"The oil base mud, constantly checked by a mud engineer, has been found to remain essentially stable, regardless of the relatively high percentage of solids from diamond bit cuttings which, from the nature of the bit operation, tend to be minute and thus more readily carried in suspension in the drilling fluid.

"Flow line temperature remains consistently in the range of 110 to 112°F. regardless of outside thermometer readings. Filter tests show zero fluid loss, with a cake thickness of 1/64 inch."

Total cost of maintaining Black Magic averaged only $37.25 per day for the first 170 days, including all transportation charges from the Premix Plant in Houston! Black Magic changed the mud operation from the most costly to the most economical phase in the entire drilling program. No other drilling fluid will out-perform Black Magic for low maintenance costs, savings in rig time, and general improvement of the drilling operation.

*The oil base mud was Black Magic.

OIL BASE, INC. MAIN OFFICE and PLANT: 130 ORIS ST., COMPTON, CALIF.

HOUSTON PLANT: [illegible]

Branch offices, warehouses, Long Beach, Ventura, Houston, Fort Worth, Corpus Christi, Oklahoma City, Midland, Wichita Falls, Field Offices, Elgin, Ill., Smith, Kansas, Wyoming

BLACK MAGIC • WHITE MAGIC • OB GEN • OB GEL • CHEMICAL "V" • CHEMICAL "X" • OB ZERO • OB MIX FIX • OB WATE • OB HEVYWATE • OB MUD GUNS • OIL BASE HAND CLEANER

Precision STUD BOLTS

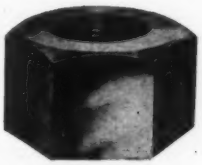
MANUFACTURED IN HOUSTON TO YOUR SPECIFICATIONS

ALLOY STEEL

SAE 4140—CHROME MOLY HEAT TREATED TO ASTM SPECIFICATIONS
A-193, GRADE B7—EACH STUD STENCILLED. - - - - - - - - - - - - N4 B7

CHROME MOLY VANADIUM HEAT TREATED TO ASTM SPECIFICATIONS
A-193, GRADE B14—EACH STUD STENCILLED. - - - - - - - - - - - - NB 14

HEXAGON NUTS



AMERICAN STANDARD HEAVY SERIES — COLD PUNCHED
SEMI-FINISHED ASTM A-194—CLASS 2—ASTM A-194
—CLASS 2 H.

THREADED-COARSE THREAD—8 PITCH, 12 PITCH AND WHITWORTH STANDARD.

STAINLESS STEEL

TYPES 303, 304, 316 AND 347 — BAR AND NUTS IN STOCK.
HEX HEAD BOLTS IN TYPE 304 IN STOCK.

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FROM STOCK.

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For any WELL, any CONDITIONS

NATIONAL WELL-HEAD EQUIPMENT

You can handle any well control problem with a National Christmas Tree. The almost limitless combinations of National components enable you to get a well-head assembly that suits the conditions perfectly.

Safe construction is built into every piece of National well-head equipment. Parts are designed to provide extra strength to sustain loads. Shop tests up to 200% rating assure sound, leak-proof parts that will stay on the job under severe conditions.

Full-opening components provide unrestricted working area. Suspension and packing elements are self-locating and self-activating to permit fast, positive action. Flange dimensions conform with A.P.I. Standards.

Your National Supply Store has bulletins describing National Well-Head Equipment for all well conditions. Ask for them, or write us.

THE NATIONAL SUPPLY COMPANY

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EXPORT: NATIONAL SUPPLY EXPORT CORPORATION, 30 ROCKEFELLER PLAZA, NEW YORK, N. Y., U. S. A.; RIVER PLATE HOUSE, 12 SOUTH PLACE, LONDON E. C. 2.

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT . . . SPANG PIPE . . . SUPERIOR & ATLAS ENGINES

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Tru-Rol

ROLLER BEARINGS

Longer Lasting! Better Performance! More Economical!

Here's a low-cost bearing that's an efficient companion to Rollway's famous bronze retainer bearings. It's been thoroughly tested and proved . . . gives remarkable performance where there has to be just the right balance between the economy and precision factors of bearing selection.

TRU-ROL Bearings feature Rollway's exclusive "Guide Lips"—curved, broad flanges in the steel retainer pockets that guide the rollers in perfect alignment and keep them properly lubricated.

TRU-ROL design and construction assure precision operation . . . and long, dependable service . . . *at a considerable saving.* Specify Tru-Rol . . . and obtain the high standards of workmanship and materials that have distinguished Rollway Bearings for more than 40 years.

Engineering Service...
If you have a particular problem, contact us. A Rollway engineer will be available for consultation with you—without obligation, of course.

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What Happens When 150,000,000 People Say:

"I WANT!"

THE STORY OF OIL

COLONEL Edwin Drake's oil well, drilled in 1859, produced only 20 barrels daily . . .

But it gave people a taste of the benefits of petroleum—and a great industry was off to a flying start!

The first drilling rigs—first refining equipment—were adequate for that early demand.

But invention of the automobile, airplane, Diesel engine and other great machines in turn demanded great invention in oil—and old-fashioned equipment gave way to scientific research laboratories, modern refineries, pipelines, tankers and tank cars.

Each year demand made them bigger and better!

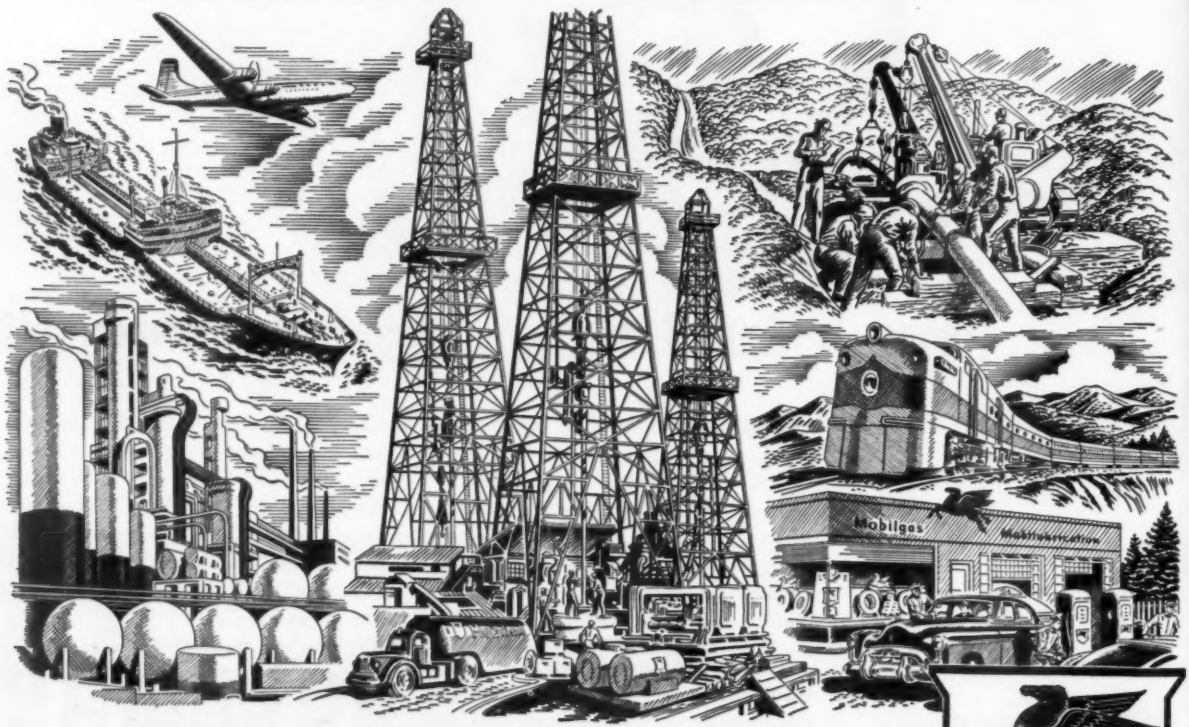
Today, thousands of oil companies with oil fields, refineries, bulk plants, service stations and cost-cutting transportation systems—deliver over 1,840,000,000 barrels of petroleum yearly—meet U.S.A.'s demands for *value in oil.*

And, today, the responsibilities of Socony-Vacuum, one of the oldest companies in the industry, are constantly mounting . . .

Unprecedented demand for petroleum products calls for expansion in every phase of our efficient, coordinated operation . . .

46,400 independent "small" businessmen must be kept *competitive*—supplied with what it takes to provide a *big money's worth* for you—a good living for themselves.

When 150,000,000 Americans say, *"I want,"* it takes businesses of all sizes to deliver!



DEMAND DETERMINES BIGNESS

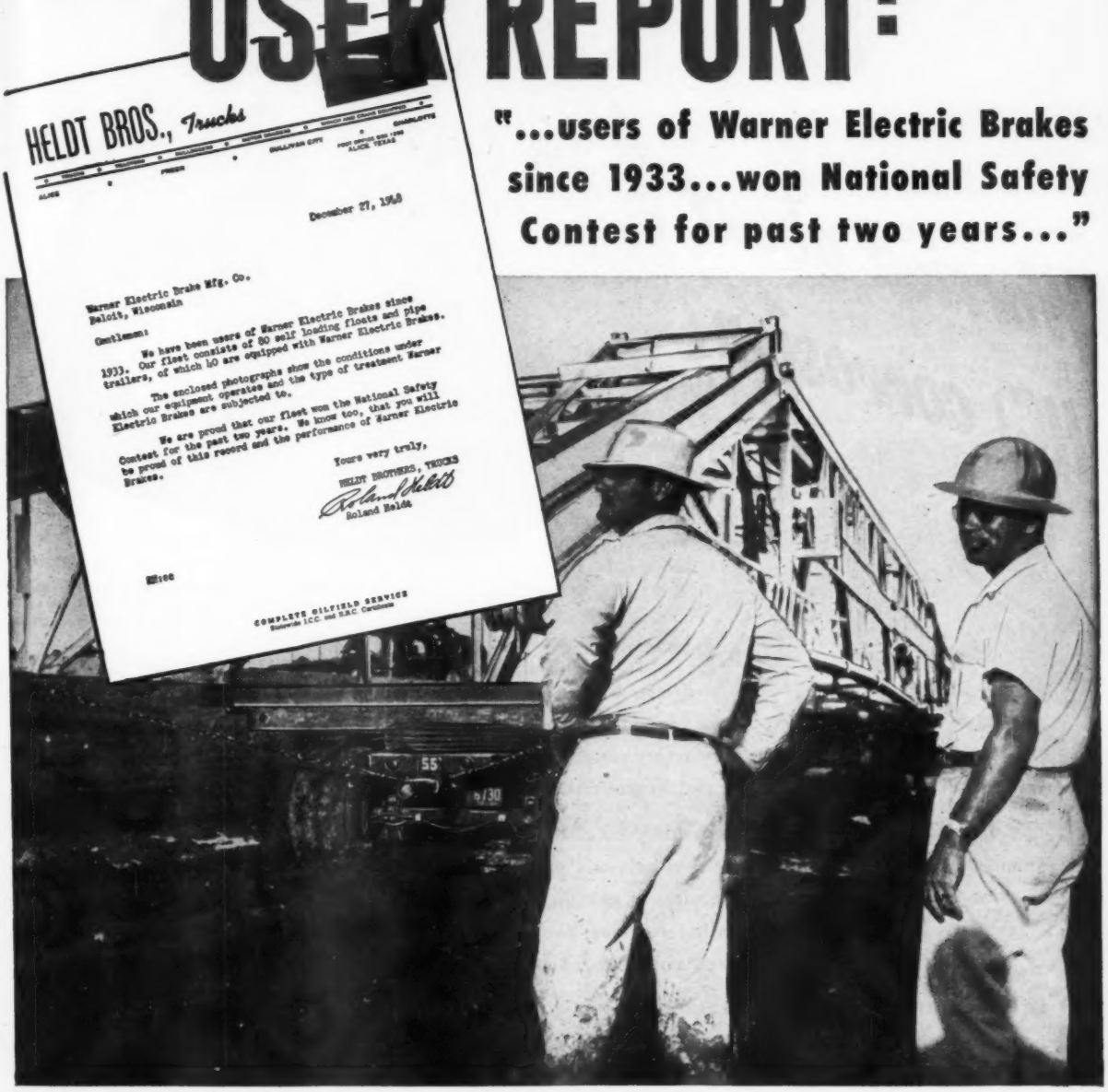
The Flying Red Horse Companies

SOCONY-VACUUM OIL COMPANY, INC. • MAGNOLIA PETROLEUM CO. • GENERAL PETROLEUM CORP.

SOCONY-VACUUM

USER REPORT:

"...users of Warner Electric Brakes since 1933...won National Safety Contest for past two years..."

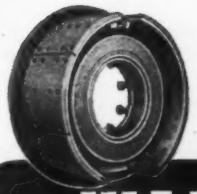

HELDT BROS., Trucks
December 27, 1950
Warner Electric Brake Mfg. Co.
Beloit, Wisconsin
Gentlemen:
We have been users of Warner Electric Brakes since 1933. Our fleet consists of 80 self loading floats and pipe trailers, of which 40 are equipped with Warner Electric Brakes.
The enclosed photographs show the conditions under which our equipment operates and the type of treatment Warner Electric Brakes are subjected to.
We are proud that our fleet won the National Safety Contest for the past two years. We know too, that you will be proud of this record and the performance of Warner Electric Brakes.
Yours very truly,
HELDT BROTHERS, TRUCKS
Roland Heldt
Roland Heldt
Encl
COMPLETE OILFIELD SERVICE

LOOK at that muck and mire! That's the stuff that's sheer murder on men and machines — the stuff you've got to expect when you go after oil — because oil is where you find it. Just ask the Heldt Bros., who specialize in going where oil is — and roads just ain't. That means, too, that trailer brakes must withstand every kind of severe weather and road condition. So take a tip from Heldt Bros. — get Warner Electric Brakes.

Warner Electric Brakes give lightning-fast action with an infinite degree of braking control, plus low-cost installation and maintenance. There's full clearance under the tractor and trailer — nothing to get knocked off or leak — no exposed braking equipment — no rods to rattle — no tubing to split — only simple wiring to each wheel.

For full information see your nearest Warner Electric Brake dealer — or write:

WARNER ELECTRIC BRAKE & CLUTCH COMPANY
DEPT. OGJ, BELOIT, WISCONSIN



Revolutionary!
Warner Electric Brakes of 2-shoe construction in sizes 16½" x 5", 16½" x 6", and 16½" x 7". A really new concept of super-stopping power. Ask about them.

WARNER
THE ORIGINAL AND PROVEN
ELECTRIC BRAKES
SINCE 1927

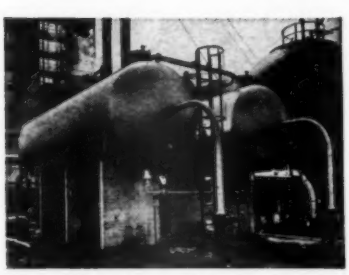
Worried about HCl corrosion?

Monel-lined top section of a large fractionating column. Made by the A. O. Smith Corporation for one of the nation's largest oil refiners.

Many years of service experience backed by extensive research, have shown that Monel® has satisfactory resistance to destructive corrosion by hydrogen chloride and hydrochloric acid.

In applications where low concentrations of hydrochloric acid must be handled regularly, Monel vessels and processing equipment have given outstanding service. In petroleum refining, for example, Monel-lined fractionating columns, tanks, and Monel piping and fittings have substantially outlasted other metals.

In addition, Monel is an excellent structural material, possessing high strength, and good workability. Monel can be welded to form corrosion-resistant joints; can be machined, formed, and bent with ordinary shop tools and methods.



Monel-lined tanks installed at the plant of a large Southern oil refiner. Tanks are lined with Monel to combat corrosive action of dilute hydrochloric acid.

The tanks were fabricated by Wyatt Metal & Boiler Works, Houston, Texas.

* * *

Monel, like other Nickel alloys, is in short supply. However, in planning for the future or for equipment vital to Defense, it is suggested that you consult our Corrosion Engineering Service on any questions regarding corrosion-resisting materials.

EMBLEM OF SERVICE

NICKEL INCO ALLOYS

TRADE MARK

MONEL® • "K"® MONEL • "R"® MONEL • "KR"® MONEL • NICKEL • "D"® NICKEL • "L"® NICKEL INCONEL® • DURANICKEL® • PERMANICKEL® INCONEL "X"®.

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street, New York 5, N. Y.

ENGINEERING News

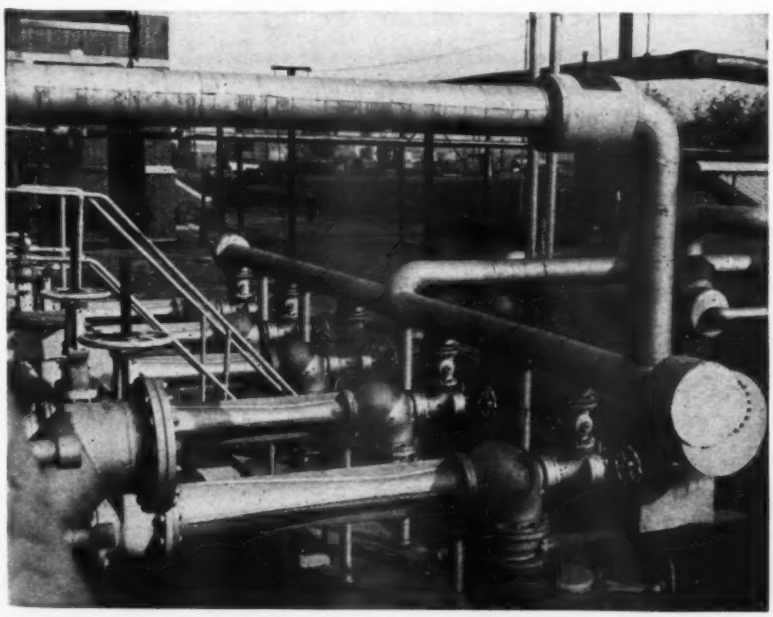
JET COMPRESSORS EASE PEAK LOADS FOR GAS CO.

The illustration shows a typical arrangement of SK Gas Jet Compressors at the plant of The Brooklyn Union Gas Company and indicates how more and more companies are making use of the operating efficiencies and economies offered by these compressors in meeting peak load conditions.

All five gas compressors shown are being used to mix Butane or Propane with atmospheric air and to discharge the mixture against a maximum of 9/10 of a pound back pressure. At installation, the control valves on the suction lines were adjusted for operation at the required heating value. In this case, the Butane or Propane passes from the vaporizer into a header which supplies all five compressors. This gas, at 45 psi gauge, entrains atmospheric air in desired proportion and, once adjusted, operates at a fixed ratio giving constant Btu discharge. A spindle in each nozzle allows adjustment for using Butane or Propane. Each of the units shown has a capacity of 210,000 standard cubic feet of mixed gas per hour at 540 Btu per cubic foot. Control in this installation is manual although SK Gas Jet Compressors can be controlled automatically.

Another advantage of these compressors is the fact that they eliminate the need for a mechanical compressor or blower on the atmospheric air inlet. The plug valve in the L-P line is used to place each compressor in operation and one through five of the compressors can be operated as conditions necessitate. The integral check valves prevent back flow to atmosphere.

For details on SK Gas Jet Compressors, request Bulletin 4-F.



Steam Jacketed Pump Handles Viscous Liquids At High Temperatures

The SK Steam Jacketed Herringbone Gear Pump shown in the break-away drawing is designed to handle viscous liquids such as slop oils, asphalts, tars and waxy materials at high temperatures efficiently and economically.

To insure even thermal distribution, the steam jacket on the pump completely covers the internal parts. The inlet, outlet, and cover flanges are cast integrally with the pump base, and rigid housing construction eliminates any possibility of distortion due to pipe line strain or misalignment. Straight bore housing also prevents shaft deflection and bearing overhang.

Shafts are of heavy duty alloy steel, finish ground. Pressure on the stuffing box is dissipated through a channel in the cover plates. Steam connections on the jackets are designed to permit a variety of piping arrangements. Complete rotor and bearing assembly can be removed as a unit by releasing the coupling and removing the rear cover.

Pumps are available in Meehanite B, cast steel, bronze, or special alloy case. Internal parts are built to specifications.

For details on SK Steam Jacketed Pumps, request Bulletin 17-A, Supplement SJ.

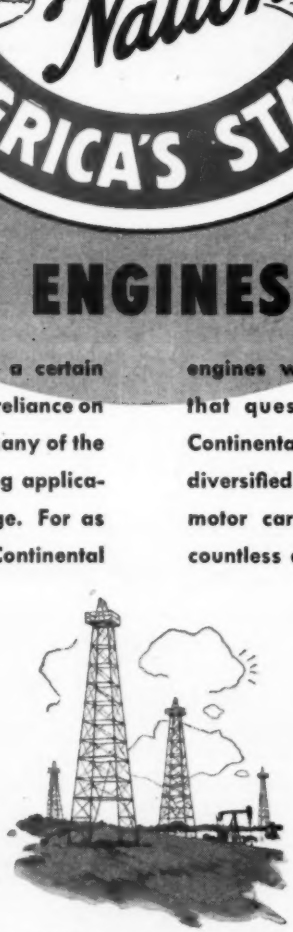
SCHUTTE and KOERTING Company
Manufacturing Engineers

THIS TRADE-MARK IS RECOGNIZED AND RESPECTED

CONTINENTAL MOTORS
Powerful as the Nation
AMERICA'S STANDARD

WHEREVER ENGINES ARE USED

When you stop to consider, there's a certain fitness about the petroleum industry's reliance on Continental Red Seal engines for so many of the producing, processing and distributing applications within their broad power range. For as folks still in their fifties can recall, Continental Motors played a major role in those early automotive developments which sparked the oil industry's growth to its giant stature of today. In the first decade of this century, when many persons still doubted that the motor car was really here to stay, the day-after-day dependability of Continental Red Seal engines was already doing its part to settle that question for good. Today, of course, Continental Motors serves a far broader, more diversified market. Its products power not only motor cars, taxicabs, buses and trucks, but countless other types of equipment, on land, at sea and in the air. Every Red Seal model is engineered expressly to its application . . . designed to do one job and do it well. That is why, in the oil field, as elsewhere, every Red Seal that goes to work adds lustre to an emblem already respected wherever engines are used.



6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • • • 3817 S. SANTA FE AVE., LOS ANGELES 58, CALIF.

Continental Motors Corporation
MUSKEGON, MICHIGAN

Form-Set Wire Rope

now costs very little more than the non-preformed type

Unseized Form-Set rope. Not a single wire has become unlaid after cutting. This absence of wildness makes Form-Set easy to handle.

Another demonstration of "no wildness." A strand and one of its wires have been lifted out of place; the others lie undisturbed. There are no inner forces to make the rope touchy.

We want *everybody* to know that Bethlehem Form-Set rope (preformed) is now almost as low in price as the conventional, non-preformed kind. We want everybody to know that the advantages of Form-Set rope are available at so little extra cost.

What *are* these advantages? Here's what thousands of users have found:

★ Form-Set rope has little or no internal tension . . . because the wires and strands are preformed, given their permanent shape, before being laid in the rope. Hence the wires have no urge to spring apart, even when cut.

★ This absence of tension means that the rope has high resistance to bending fatigue. It lasts longer on applications where bending fatigue is a serious factor.

★ Absence of tension also means better spooling, far less kinking.

These are a few of the major points, and they are important. Many, many users have always considered Form-Set rope an excellent investment, even at the old price differential. Now it costs so little more than non-preformed rope that it suits almost everybody's pocketbook.

If you haven't been quoted on Form-Set recently, ask for details today. Then try a reel. You'll find we aren't talking through our hats!

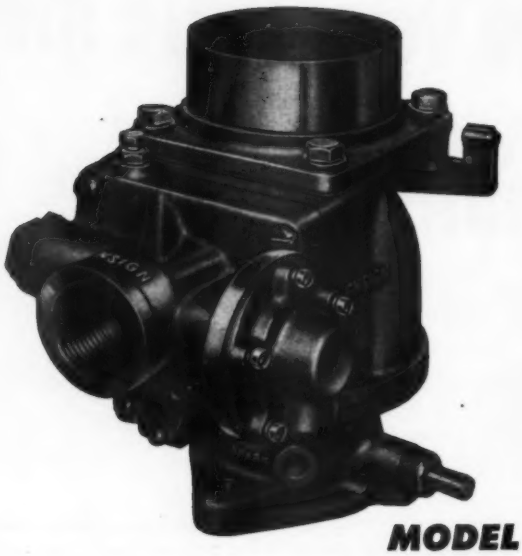
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

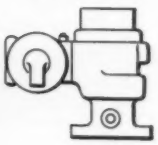
When you think WIRE ROPE . . . think BETHLEHEM

ENSIGN CARBURETOR



UPDRAFT

DOWNDRAFT



MODEL XG GAS CARBURETOR

- *For Natural Gas, Butane-Propane and other mixed gases.*
- *Built-in fixed orifice economizer.*
- *Instant starting. Utilizes separate set of adjustable gas-air orifices.*
- *Provisions for balancing air-fuel ratios against air entrance losses.*
- *Interchange venturii to meet wide range of engine operating conditions.*
- *Made in 1¼, 1½, 1¾, and 2" SAE Sizes.*
- *Nearly 40 years' experience in building carburetors for America's leading gas engines are behind the design and production of this new ENSIGN Carburetor.*

ENSIGN CARBURETOR COMPANY

Send for Bulletin No. 7078

7010 South Alameda St., Huntington Park, Calif.

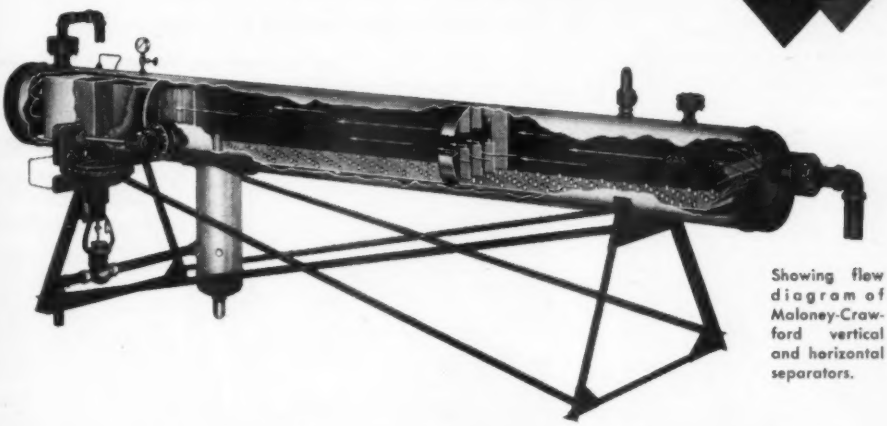
2330 West 58th St., Chicago 36, Illinois

XUM

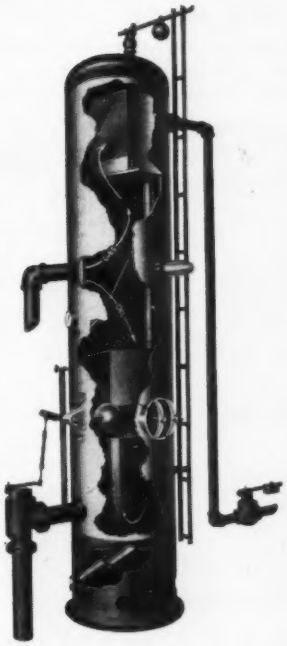
The Heart of an Oil and Gas Separator is the Flow System

MALONEY-CRAWFORD SEPARATORS HAVE FLOW SYSTEM FEATURES THAT GIVE

Maximum Separation



Showing flow diagram of Maloney-Crawford vertical and horizontal separators.



MALONEY-CRAWFORD RANGE OF MODELS AND PRESSURES OFFER A VERSATILITY TO MEET ALMOST ANY SEPARATION PROBLEM

STOCKS AND SERVICE AT THESE OIL CENTERS: Artesia, N. Mex.; Calgary, Canada; Corpus Christi, Texas; Casper, Wyo.; Dallas, Texas; Edmonton, Canada; Farmington, N. Mex.; Fort Worth, Texas; Houston, Texas; Lafayette, La.; Newcastle, Wyo.; New Orleans, La.; Odessa, Texas; Oklahoma City, Okla.; Tampa, Texas; San Angelo, Texas; Snyder, Texas; Tulsa, Okla.; Wichita Falls, Texas.

MALONEY CRAWFORD

MALONEY-CRAWFORD TANK & MFG. CO.

FACTORY AND GENERAL OFFICE: 38 NORTH PEORIA—BOX 659—TULSA, OKLAHOMA
EXPORT REPRESENTATIVE: Baird Lines, 420 Lexington Avenue, New York, N. Y.
CANADIAN REPRESENTATIVE: Maloney-Crawford of Canada, Ltd., Edmonton, Canada
ROCKY MOUNTAIN REPRESENTATIVE: W. H. Connor, Inc., Casper, Wyo.
TEXAS PANHANDLE REPRESENTATIVE: H. W. Waddell, Pampa, Texas

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ELECTRODES

cut welding costs all along the line

OPERATOR

"easy to use"

"I like G-E rods because they are easy to use—I can make more welds per day. And no matter what sort of welding work I have to do, ordinary or special, there's always a 'right' G-E rod for the job."

WELDING ENGINEER

"excellent mechanical properties"

"We can more than meet our specifications by using G-E electrodes. They have excellent mechanical properties—high tensile strength, good ductility, and soundness."

PLANT MANAGER

"for fast and economical production"

"Our plant aims for fast, economical and quality production. At the same time, we want to keep our operators happy with the tools we provide. We chose G-E electrodes because they do both jobs."

PURCHASING AGENT

"high quality product at right price"

"By using G-E electrodes we get a high quality product at the right price—and get it promptly. We can get prompt service right from our local distributor."

Order arc-welders, electrodes, accessories, and renewal parts from your G-E Welding Distributor. For more information, write: Apparatus Dept., General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC

711

POINT NO. 4
EVERY JONES PONY ROD is made to the same high standards as Jones Sucker Rods. Pony rods undergo the greatest stress . . . lift the heaviest loads. Always use Jones Pony Rods with Jones Sucker Rods.

LOOK FOR THE GREEN RODS

JONES

SUCKER RODS

Best in the Field!

THE S. M. JONES COMPANY *Division of Buffalo-Eclipse Corporation*

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SALES OFFICE:
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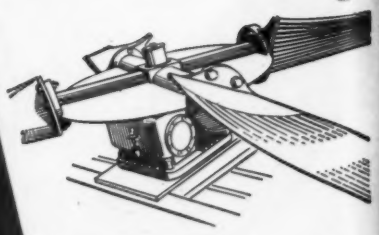
Buffalo International Corp., 50 Church Street, N. Y. C.



Cleveland Cooling Tower Drives (built in sizes 50 CU to 500 CU inclusive) are rated under Class 2 service conditions, except that thermal limitation does not apply. Heavy, externally ribbed housing effectively dissipates heat to air stream.

Cleveland Type CU...ideal drive for cooling towers

• This worm gear drive is designed specifically for cooling tower service. It meets a long-felt need for a compact, heavy duty speed reducer that will operate continuously, at high speeds and for long periods. It is inherently quiet in operation. Extreme conditions of heat and humidity do not affect it. It carries high thrust loads and high radial loads without loss of efficiency. It lends itself to rugged mounting, and due to the simplicity of its design, it is easily installed, serviced and adjusted in the field.

Every CU drive is run in and pretested under load before it leaves the factory. Thousands of units now in use prove its reliability in all classes of service—in the oil fields, in industry, in air conditioning systems in commercial and public buildings—in short, wherever there's a cooling tower, you can depend on CU.

Write for Bulletin 135 for full description of Type CU. Ask also for free literature on other Cleveland units. The Cleveland Worm & Gear Co., 3286 East 80th Street, Cleveland 4, Ohio.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication. In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

XUM

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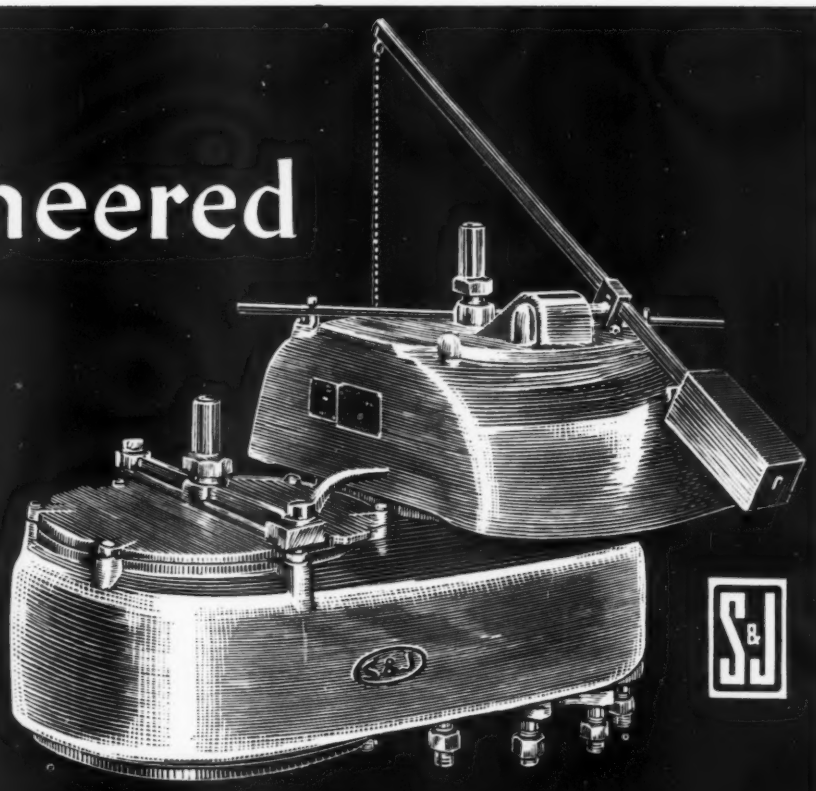
Field Engineered



HERE is Shand & Jurs' new poppet type breather valve for low pressure above ground petroleum storage and transfer tanks. Improvements in design have been dictated by experience in the field gathered under all weather and operating conditions. This is truly a breather valve that will give matchless protection to tanks and their valuable contents.

Designated, Fig. ST-6949, the new S&J breather valve incorporates valve pallets that automatically drain all condensation away from their seats. The design provides tremendously increased flow capacities within the range of normal pressure settings and overpressure allowances. Molded thermosetting phenolic pallets and stainless steel pallet guides offer maximum resistance to corrosion and contribute greatly to the long life of this S&J breather valve. The valve is completely screened and hooded, keeping windblown particles, insects, rain, sleet and snow from impairing its operation. For around-the-year tank venting performance, this S&J breather valve can't be beat.

Shand and Jurs Co. 917 CARLETON STREET · BERKELEY · CALIFORNIA

NEW YORK 295 Madison Ave. CHICAGO 10409 S. Western Ave. HOUSTON 814 M & M Bldg. TULSA 310 Thompson Bldg. LOS ANGELES 714 W. Olympic Blvd. SEATTLE 3000 Western Ave.

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Engineers

TO THE PETROLEUM INDUSTRY

- *Specialists in Surge Control in Gas and Air Piping*
- *Leaders in Engine and Compressor Noise Reduction*

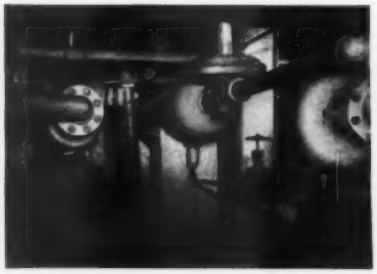
CONSULT BURGESS-MANNING ENGINEERS

As originators of the Snubbing Principle to reduce noises from engine exhausts and compressor intakes and a pioneer in surge control in gas and air piping, we are capably qualified by a quarter century of broad experience to serve you. Continuous, intensive research to improve the design of our Snubbers and diligent study of thousands of Burgess-Manning Snubber applications has kept us abreast of the tough, new operating problems in engine and compressor noise restriction and surge control confronting the petroleum industry. Consult Burgess-Manning, today: Sound engineering counsel, reliable Snubber design, a product manufactured to exacting specifications, guaranteed Snubber performance. Write for literature.

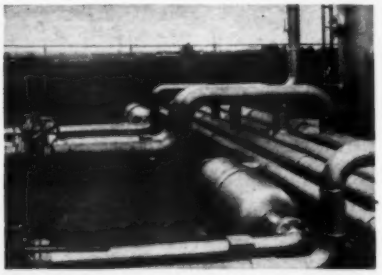
BURGESS-MANNING COMPANY

749 East Park Avenue, Libertyville, Illinois

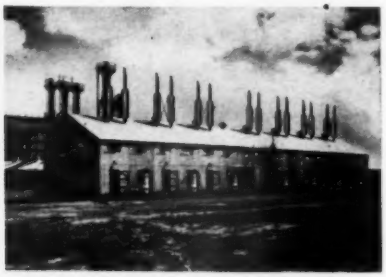
FLUID CATALYTIC UNIT—A large size Burgess-Manning Snubber installed on flue gas blow off from regenerator on fluid catalytic unit of a Texas petroleum corporation.



SURGE CONTROL—Gas and Air Line Snubbers installed on the discharge of the first and high stage of a compressor.

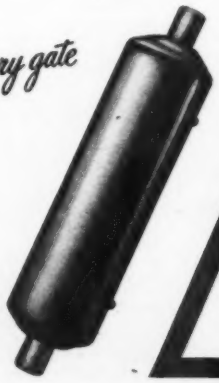


GAS BOOSTER STATION—Burgess-Manning Snubbers installed in the high pressure discharge lines in a gas booster station.



GASOLINE PLANT—Burgess-Manning Exhaust Snubbers installed on 600 hp engines in an Oklahoma gasoline plant.

From well head through the refinery gate



...it's Burgess-Manning

INSTALLATIONS

- Stationary and portable internal combustion engines
- Steam discharge
- Positive displacement and reciprocation vacuum pump discharge
- Compressors, blowers

PETROLEUM APPLICATIONS

Oil and gas production • oil and gas well repressuring and recycling • gas transmission • gas distribution • natural gasoline industry • manufactured gas industry • petroleum refining • petrochemical process industry • drilling • oil well pumping • crude oil and product pipe lines • chemical industry • all industries handling air, steam, refrigerants.

For prompt service contact our New Engineering and Sales Office

BURGESS-MANNING CO.

1203 Dragon St.

DALLAS, TEXAS

It Takes You There When Other Cars Can't!

The 4-Wheel-Drive Willys Station Wagon, powered by the high-compression *Hurricane* Engine, assures year-around transportation over all kinds of roads. It climbs a 66 per cent grade and goes through mud, sand, snow and roadless country that stops other cars. There is room for six passengers, plus luggage, tools or equipment. The rear seats easily lift out to provide 98 cu. ft. of cargo space. See your Willys dealer for a demonstration of this remarkable car.

4-WHEEL-DRIVE WILLYS STATION WAGON

AHEAD OF THE FIRST SHOT

First there's financing by the FIRST in Dallas

Give us an opportunity to say YES

The Southwest's Pioneer Oil Bank

FIRST NATIONAL BANK *in* DALLAS

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

ASSURE ACCURACY IN YOUR GAS DEVELOPMENTS

When you use AC-ME and R.S. Specialties you can guarantee accurate tests and measurements.

Manufacturers of these Instruments:

AC-ME Recording Gravitometer-Controller

CEMENT TESTING INSTRUMENTS
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- Cement Slurry Mixing Cells

CORE TESTING INSTRUMENTS
- Core Cutting Knife
- Laboratory Core Drills
- Porosimeter-Stevens Type
- High-Pressure Flood Pots

GAS TESTING INSTRUMENTS
- Recording Gravitometer
- Specific Gravity Balance
- Dew Point Tester
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DEAD WEIGHT INSTRUMENTS
- Standard Dead Weight Gauge
- Portable Dead Weight Tester

LIQUID TESTING INSTRUMENTS
- Liquid Gravitometer
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- Pressure Hydrometer Jar
- Specific Gravity Bombs
- Corrosion Test Bombs

AC-ME Recording Gravitometer

Write today for your copy Bulletin No. 50 Describing R.S. and AC-ME Testing Instruments.

R.S. Dead Weight Gauge

Large stocks of laboratory apparatus and supplies for oil and gas testing are available for your convenience.

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Subsidiary of Cenco Corporation

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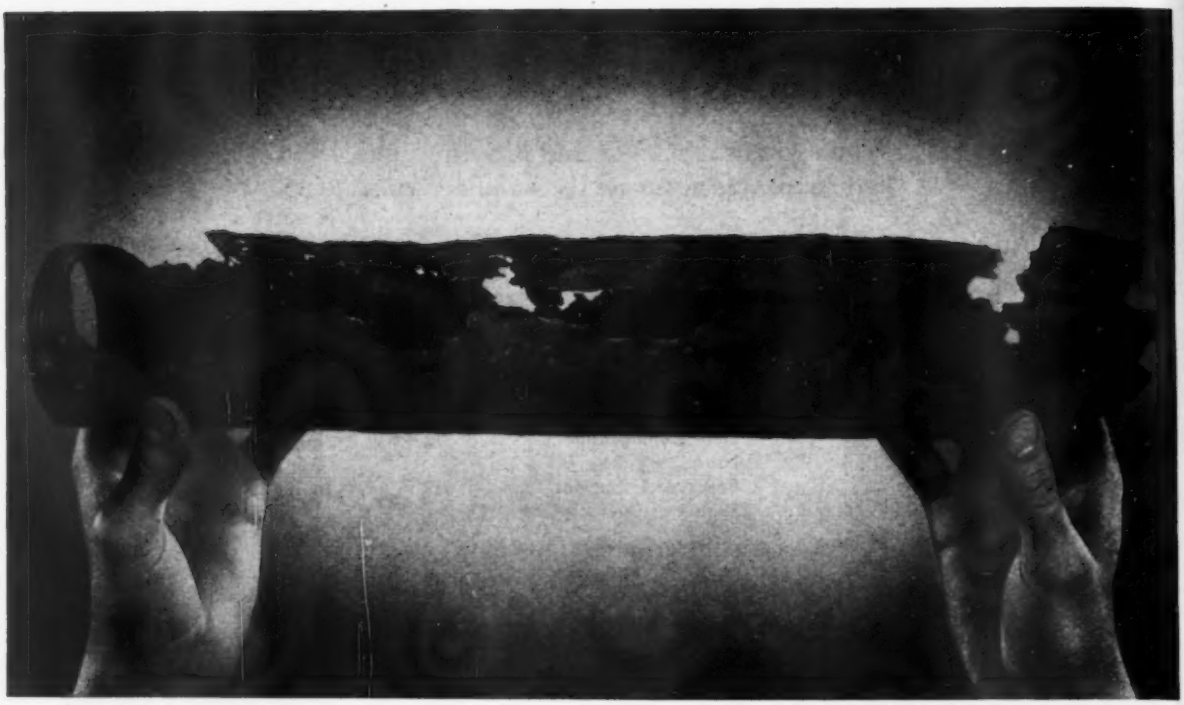

Stop corrosion with TAPE!

Earth acids, alkalies can't harm pipes wrapped with plastic tape

Industry pays two hundred million dollars each year to replace buried pipes that are rusted beyond repair! "SCOTCH" Electrical Tape No. 22 can cut *your* share of these corrosion costs.

This easy-to-apply tape is ideal protection against corrosion of pipes above or below ground. Its plastic backing has excellent resistance to corrosive action of soils, salt water, acids, alkalies and alcohols.

Clean, too! "SCOTCH" Electrical Tape No. 22 is quick to apply, sticks at a touch, eliminates the dangers of hot coatings. Estimated cost is *less than half* that of other coating methods! Write Dept. OB251 for full information.

NEAT, TIGHT WRAP with "SCOTCH" Electrical Tape No. 22 gives this gas service pipe thorough anti-corrosion protection.

Quick facts about "SCOTCH" Electrical Tape No. 22

- **TOUGH**—plastic backing is unaffected by oil, water, acids, corrosive vapors, weather.
- **STRETCHY**—conforms snugly to uneven surfaces.
- **HIGH DIELECTRIC**—over 10,000 volts.
- **THIN CALIPER**—only .001 inch thick, gives neat jobs.
- **NON-CORROSIVE**—contains no sulphur-bearing compounds.
- **WIDTHS**—½ in., ¾ in., 1 in., 2 in., 3 in., 4 in.

The term "SCOTCH" and the plaid design are registered trade marks for the more than 100 adhesive tapes made in U. S. A. by MINNESOTA MINING & MFG. CO., St. Paul 6, Minn., also makers of "Scotch" Sound Recording Tape, "Underseal" Rubberized Coating, "Scotchlite" Reflective Sheeting, "Safety-Walk" Non-Slip Surfacing, "3M" Abrasives, "3M" Adhesives.

General Export: DUREX ABRASIVES CORP., *New Rochelle, N. Y.* • *In Canada:* CANADIAN DUREX ABRASIVES LTD., *Brantford, Ontario*

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Be sure with Pure

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THE PURE OIL COMPANY

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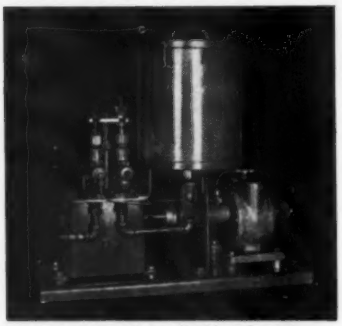
General Offices, Chicago, Illinois

Fast Expanding to meet your needs

...the *Manzel* Chemical Feeder Line

NEW Rotary Gas Drive Feeders

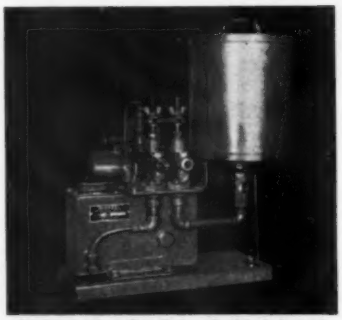
Efficient, dependable, Rotary Drive Motor operates on as low as 3 lbs. pressure.



Rotary Gas Drive Self-Lubricated

NEW Self-Lubrication

Automatic built-in system assures *complete* lubrication of Gas Motors, protects against corrosion and frequent stoppage. Available in either Rotary or Reciprocating Drive, and in kit for converting your present motor.



Reciprocating Gas Drive, Self-Lubricated

NEW Extra Large Series '85' Feeders

Adjustable to pump up to one gallon of liquid per minute per feed.

PLUS

Numerous other models, ranging in capacity from a few drops to 17.5 gallons per hour per feed.

No. CH-85 Feeder

Though Manzel Chemical Feeders are widely used and respected throughout the petroleum industry, we are working every day to add improvements, new features, and new models to the line. The new equipment described above is similar in principal to the other 'time-tested' Manzel Chemical Feeders, automatically injecting the chemical in exact proportion to the amount of liquid being pumped. Multiple units may be supplied with any number of feeds. Ask your Manzel Representative for details, or write...

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They Say—

PAD's Purpose

"It is the devout purpose of the Petroleum Administration for Defense to secure that degree of mobilization required of the oil and gas industries for the purposes of the present mobilization program with as little regimentation as is humanly possible. We intend to issue as few orders and directives as we can possibly do with, because we believe that the industry has the strength, ingenuity, patriotism, and enlightened self-interest necessary to fully discharge its functions under the defense program, if it is given reasonable freedom of action and enough materials and manpower to do the job.

"Feeling as we do, one of our first objectives was to organize a competent Materials Division to marshall the materials needs of the oil and gas industry and to make vigorous representations to the National Production Authority so that the oil and gas industry might obtain the materials it needs to do the job. PAD's authority over the allocation of materials is subordinate to that of NPA. PAD's job is to properly claim from NPA the minimum amounts of materials that are required and then to see that they are distributed fairly."

—Bruce K. Brown, deputy petroleum administrator, in an address before the San Joaquin Valley Oil Producers Association, Bakersfield, Calif.

Something Wrong in Texas

"Something is wrong when gas from a common reservoir, beginning in Texas and extending through Oklahoma and Kansas, brings a minimum of 8 cents per thousand cubic feet in Kansas, a minimum of 7 cents in Oklahoma, and less than 5 cents in Texas. Something is wrong when gas from one of the older fields, controlled almost exclusively by one company, has not brought more than 3 cents during the life of the field and this past year paid 2.6 or 2.7 cents. . . .

"The only way I can see for Texas to smooth out these irregularities is to follow the example of our neighbor states and establish a fair minimum price for gas in Texas, which would bring much additional revenue to our state."

—W. C. Windsor, Texas Independent and Royalty Owners Association, in letter to all members of Texas legislature.

Depletion Testimony

". . . Any reduction of the depletion allowance would result in six

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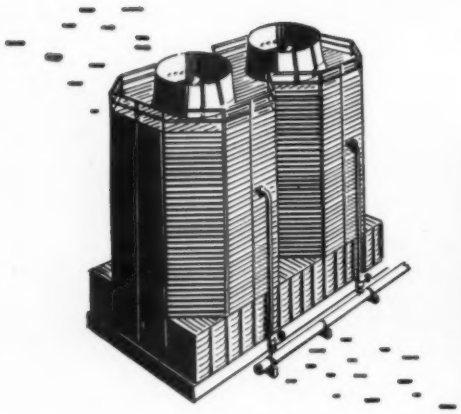

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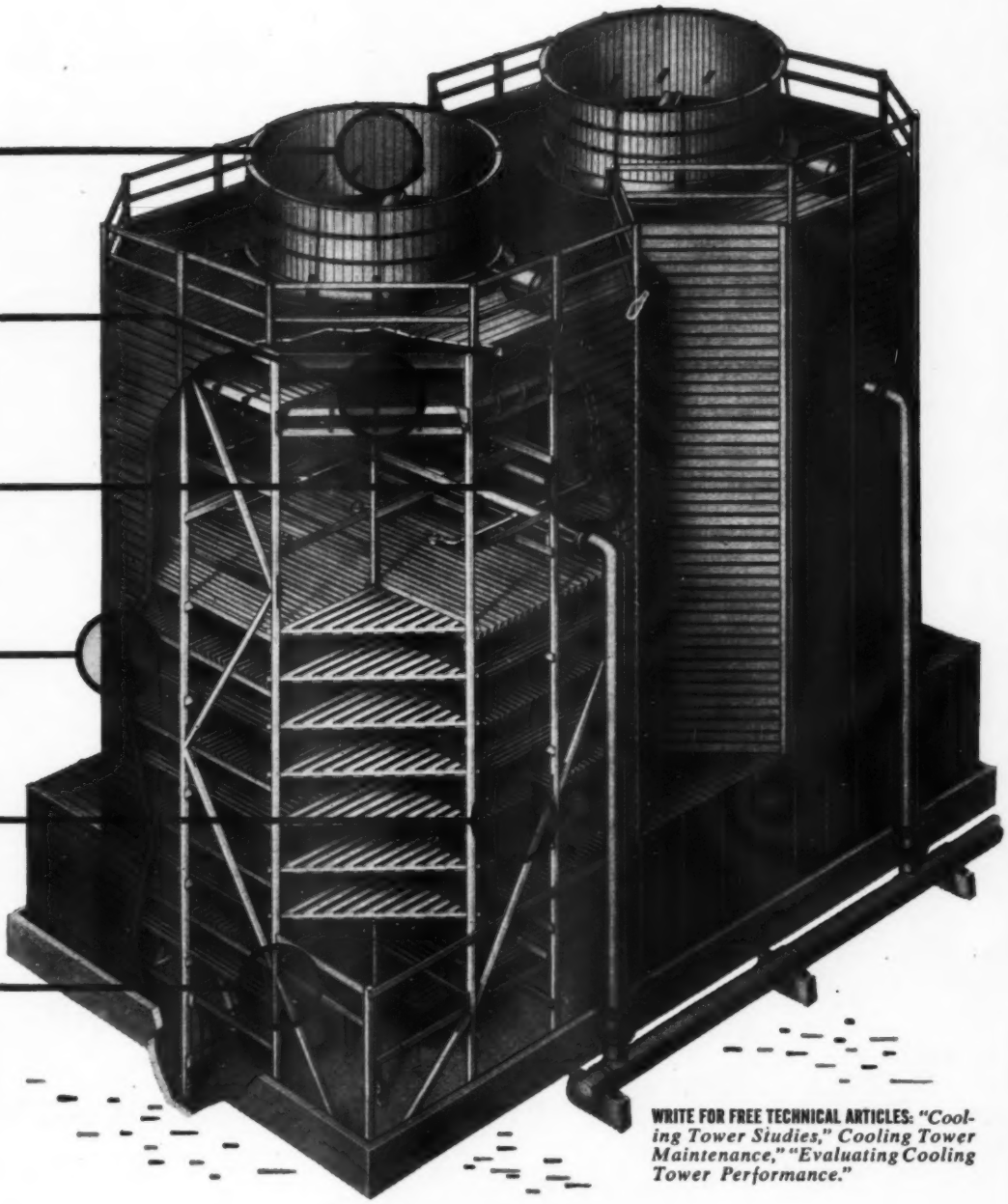

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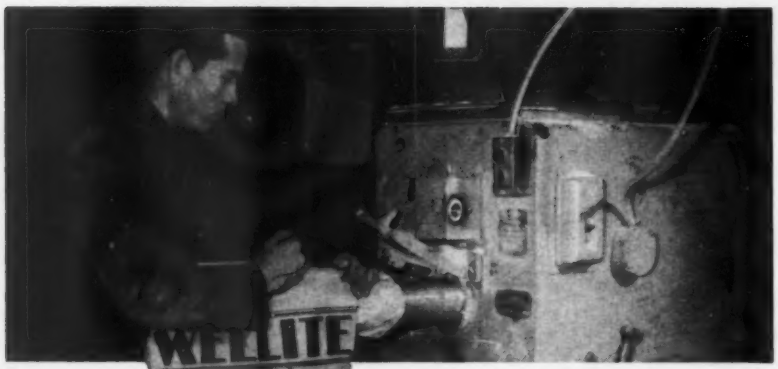

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damaging effects. The proposed cut would . . . cause drastic curtailment of the search for and development of new oil resources needed for defense . . . lead to inability to meet current demands and cause higher prices for petroleum products . . . be 'self defeating' in that revenue from the industry would be so seriously retarded that it would more than offset revenue estimated to be collected . . . cause dwindling new discoveries and development which could not be revived on short notice by reinstatement of present tax measures . . . bankrupt small, independent producers who are dependent on bank credit to develop producing properties, or force them to sell their holdings at sacrifice prices . . . and deal a death blow to a vast number of secondary-recovery operations with loss to the nation permanently of several billion barrels of oil."

—Million Barrel Capacity Committee of the National Petroleum Council in interim report to Interior Secretary Oscar Chapman.

"The necessity of continuing to strive to find new oil to replace that which we are now selling calls for a continual expenditure for drilling. The cost of dry holes is lost; cost of completing and equipping the successful wells must be financed.

"In Mississippi 516 dry wells were drilled before oil was found. Last year, out of 313 wells drilled in the state, only 124 produced oil, 9 produced gas, and 180 were dry holes. In an endeavor to replenish our own company's reserves that we have been depleting, we, in 1950, spent $300,000 in the drilling of well and were not successful in finding any new oil. This could not have been possible for us without the depletion allowance."

—W. M. Vaughey, Jackson, Miss., independent producer, in testimony before the House ways and means committee.

CALENDAR

1951

March

North Texas Oil and Gas Association, annual meeting, Kemp Hotel, Wichita Falls, Tex., March 24.

Texas Independent Producers and Royalty Owners Association, fifth annual meeting, Beaumont, Tex., March 27-28.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 29-30

Illinois Oil and Gas Association, sixth annual meeting, Mount Vernon, Ill., March 31.

April

American Gas Association, industrial and commercial gas section, conference on industrial and commercial gas, Shoreham Hotel, Washington, D. C., April 2-4.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, April 2-4.

American Society of Mechanical Engi-

Let's Examine An Average Guarantee

Most guarantees sound about alike. Although the wording may be slightly different, they usually have about the same meaning and give the same protection. The average warranty or guarantee is fine, as far as it goes. But how much protection does it really give the buyer? Let's analyze the "fine print" in an average factory warranty and see! First, the average warranty or guarantee simply sets forth that the equipment is guaranteed in event of defective materials or workmanship. The warranty is not a guarantee to the buyer that the equipment he has bought will do *his* job. Second, the average warranty is for a specific period of time. What happens to the equipment after that period is the sole responsibility of the owner. Third, the average warranty . . . in case of a failure that does come within the limits of the guarantee . . . does not cover normal wear in the period the equipment was used, or the cost of installing new equipment. So, after you boil it all down, the average warranty is chiefly a protection to the manufacturer and carefully limits in detail his responsibilities to the buyer only to the extent of defective materials or workmanship for a specific time. So in the final analysis, the average warranty does not fully protect the buyer. It is primarily a protection to the manufacturer.

Now, Let's Examine A Stewart & Stevenson Guarantee

When you buy an engine or any other product from Stewart & Stevenson Services, you are protected by *two* guarantees . . . the factory warranty against defective workmanship or materials *and* the unqualified Stewart & Stevenson "guarantee of duty." There is no fine print in the Stewart & Stevenson guarantee. We have made it as simple and straightforward as we know how. And here's what it means to the buyer. It means that Stewart & Stevenson Services guarantee your engine or equipment to do the job you bought it to do on your specific application—not just develop a certain amount of horsepower. That's right! The Stewart & Stevenson guarantee of duty specifies in plain and simple language what your engine is supposed to do on your particular job — to *your* specifications — and this Stewart & Stevenson guarantee is backed up with a provision that if your engine or equipment should fail and we cannot make it perform as specified when you bought it, we will remove the engine at our expense and refund *all* money paid.

Now, in plain language, what does a Stewart & Stevenson guarantee mean to the buyer? It means this: when you deal with Stewart & Stevenson Services, you have the protection of a guaranteed service policy—plus the manufacturer's warranty—and you know that there is no way in the world for you to buy equipment that won't do your job for the full specified period.

For more than fifty years, Stewart & Stevenson has been practicing this policy . . . a policy of a full measure guarantee and square dealing that has resulted in Stewart & Stevenson Services becoming the largest distributor of General Motors Diesel Engines in the Nation.

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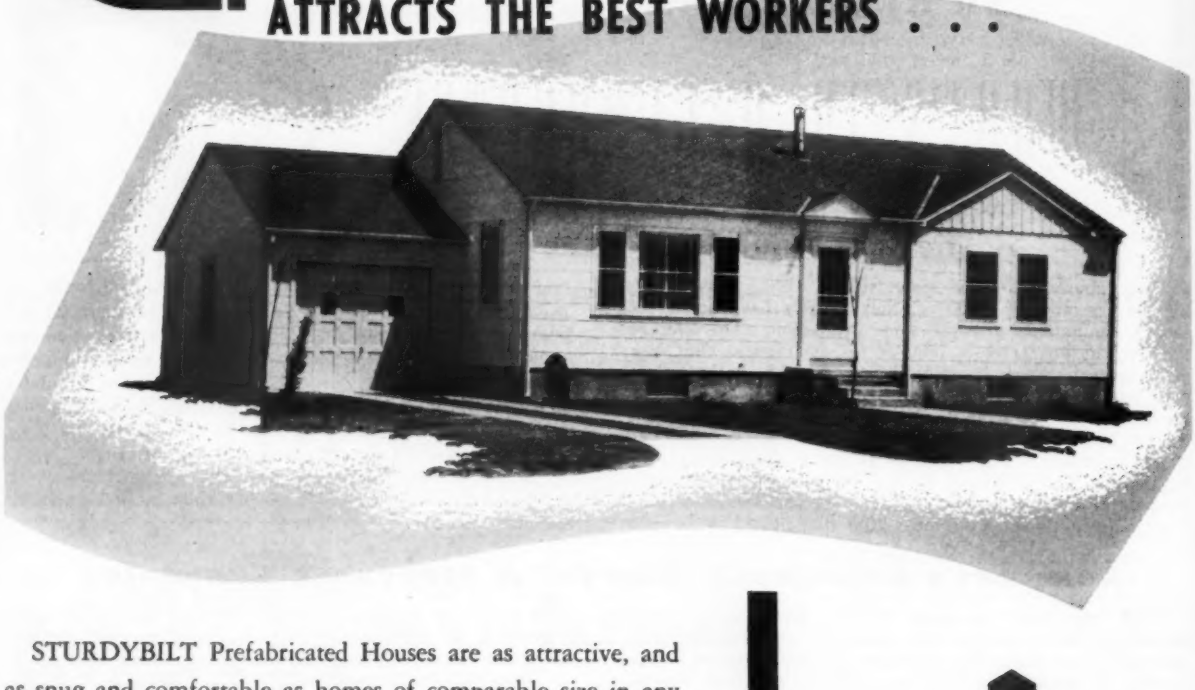

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neers, spring meeting, Atlanta, April 2-5

Oil-Heat Institute of America, annual convention and National Oil-Heat Exposition, Navy Pier and Palmer House, Chicago, April 2-6.

Instrument Society of America, New Jersey section, Essex House, Newark, N. J., April 3.

American Petroleum Institute, division of production, Eastern district meeting, Deshler-Wallick Hotel, Columbus, Ohio, April 3-5.

Pacific Coast Gas Association, annual distribution (technical) meeting, Riverside, Calif., April 4-5.

Midwest Power Conference, fourteenth annual meeting, Sherman Hotel, Chicago, April 4-6.

New York Oil Heating Association, Inc., Hotel Statler, New York, April 9.

Mid-West Regional Gas Sales Conference, Edgewater Beach Hotel, Chicago, April 9-11.

Michigan Petroleum Association, annual spring convention, Detroit Leland Hotel, Detroit, April 10-11.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 10-12.

American Institute of Electrical Engineers, District 4 meeting, McFadden-Deauville Hotel, Miami, April 11-13.

American Gas Association, distribution motor vehicle, and corrosion conference, Hotel Peabody, Memphis, April 16-18.

American Society of Lubrication Engineers, annual convention and lubrication show, Bellevue-Stratford Hotel, Philadelphia, April 16-18.

Petroleum Industry Electrical Association and Petroleum Electric Supply Association, twenty-third annual joint conference, Hotel Adolphus, Dallas, April 17-19.

National Petroleum Association, Hotel Cleveland, Cleveland, April 18-20.

American Petroleum Institute, Rocky Mountain district spring meeting, Gladstone Hotel, Casper, Wyo., April 19-20.

Second Petroleum Recovery Conference, sponsored by Texas Petroleum Research Committee and petroleum-engineering department of Texas A. & M. College, College Station, April 19-20.

Brussels International Fair, twenty-fifth annual event, Brussels, Belgium, April 21-May 6.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, Society of Exploration Geophysicists, joint annual meeting, Jefferson Hotel, St. Louis, April 23-26.

Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

Interstate Oil Compact Commission, spring meeting, La Fonda Hotel, Santa Fe, N. M., April 26-28.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, division of refining, sixteenth mid-year meeting, Mayo Hotel, Tulsa, April 30-May 3.

Materials Handling Conference, International Amphitheatre, Chicago, April 30-May 4.

May

American Institute of Electrical Engineers, District 1 meeting, Hotel Syracuse, Syracuse N. Y., May 2-4.

New York Oil Heating Association, Inc., Hotel Statler, New York, May 7.

American Gas Association, Natural-Gas Department, Dallas, May 7-8.

Independent Petroleum Association of America, mid-year directors' meeting, Cosmopolitan Hotel, Denver, May 7-8.

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tion, natural-gas department spring meeting, Dallas, May 7-9.

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 7-10.

American Petroleum Institute, division of production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

Pennsylvanian Geology and Mineral Resources of Western Indiana, fifth annual field conference, sponsored by division of geology, Indiana Department of Conservation, and department of geology, Indiana University, Bloomington, Ind., May 11-13.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

Pacific Coast Gas Association, annual transmission (technical) conference, Bakersfield, Calif., May 16-17.

American Institute of Electrical Engineers, District 5 meeting, Loraine Hotel, Madison, Wis., May 17-19.

Empire State Petroleum Association, Inc., Hotel Statler, Buffalo, N. Y., May 20-22.

American Petroleum Institute, division of marketing, mid-year meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, division of production, mid-year meeting, Brown Palace Hotel, Denver, May 28-June 1.

Institution of Gas Engineers, London, England, May 29-June 1.

Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont., May 31-June 1.

June

Society of Automotive Engineers, Inc., summer meeting, French Lick Springs Hotel, French Lick, Ind., June 3-8.

New York Oil Heating Association, Inc., Hotel Statler, New York, June 4.

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Pennsylvania Grade Crude Oil Association, 1951 annual meeting, Hotel William Penn, Pittsburgh, June 14-15.

American Institute of Electrical Engineers, summer general meeting, Royal York Hotel, Toronto, June 25-29.

July

Wyoming Geological Association, sixth annual field conference, South Central Wyoming area, July 31-August 3.

August

Society of Automotive Engineers, Inc., West Coast meeting, Olympic Hotel, Seattle, August 13-15.

American Institute of Electrical Engineers, Pacific general meeting, Multnomah Hotel, Portland, Ore., August 20-23.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month. Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, first Monday of each month, Louis Sherry's, 300 Park Ave.

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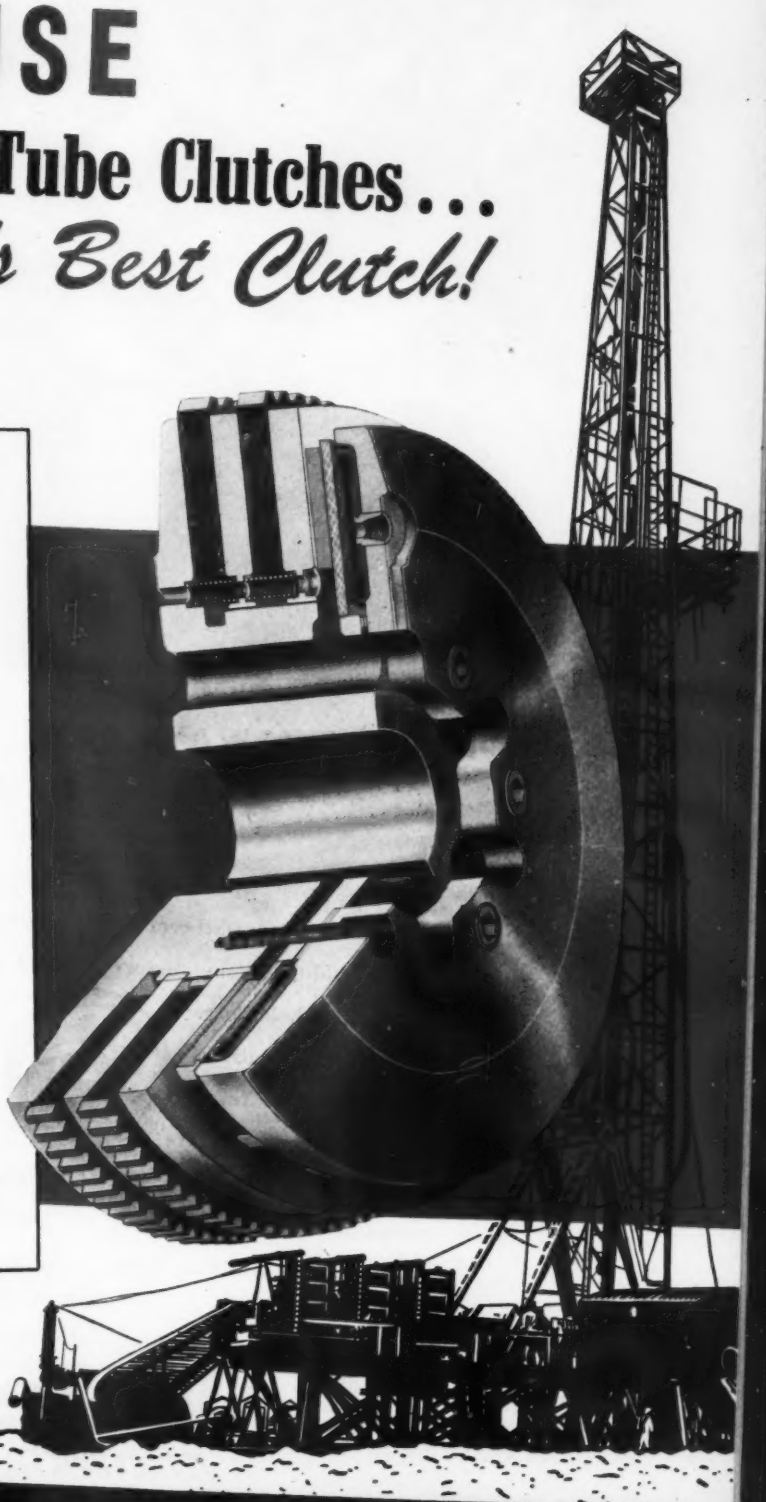

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JOURNALLY Speaking

Very Clubby

TULSA, whose chamber of commerce proclaims it the Oil Capital of the World, at last has a Petroleum Club. After years of idle talk about it, a couple of hopeful souls timidly called a meeting to discuss the possibilities and before they knew it they were holding initiation checks from more than 300 oil men and were deluged with inquiries from just about half the town.

To make good, the brave little band had to rustle up some quarters, but the venture is now elegantly housed in a former downtown night club (night life in Tulsa never having been much to write home about anyway).

So Tulsa joins a dozen or so other oil centers (dare we say subcapitals?) having petroleum clubs by that name and with their own quarters. Those we have heard about are in New Orleans, Houston, Dallas, Midland, Los Angeles, Shreveport, Jackson, Wichita, Denver, and Calgary. Now there is talk of organizing a sort of federation of petroleum clubs, or at least negotiating a reciprocal trade agreement or treaty of diplomatic recognition and nonaggression under which a member of one could drop in for a bit of hospitality when sojourning in the territorial jurisdiction of another.

Air Age

NOWADAYS when an oil company needs a new town at one of its remote locations it builds an airport first and then builds a town around it. At least that's what Richfield Oil Corp. did in Cuyama Valley, which shows how air-minded and speed-minded the industry has become.

Needed Knowledge

THE American Petroleum Institute is financing a research project to try to find out how and why oil was formed in the earth. Some people may jump to the conclusion that the object is to duplicate nature's process so that the industry can make its own oil instead of having to drill for it. Of course it might turn out that way, but right now the big idea is to be able to find oil easier through better knowledge of how nature operated. Geologists think they know quite a bit about the occurrence of oil, but plenty of men living remember when there was a common belief that rivers of oil flowed under various parts of the country, which shows how young the science of oil finding really is. As experience has shown, it is dangerous to assume that no more oil will be found. But it is even more dangerous to assume that we know all about how to find it.

Paint Blush

ACCORDING to a press release, Socony-Vacuum Oil Co., Inc., is experimenting with paints which change color with the temperature. Applied to an engine, they tell at a glance the heat of various parts.

This idea has potentialities for wider application. Some of this paint on our interior walls would reduce family arguments over the heating system and eliminate much peering at the thermostat. A good coat on the telephone pole outside our bedroom window would tell us at a glance how to dress for the day without having to try to catch the weather report on the radio. We have long suspected that the shade of cosmetics was a clue to the temperature, or at least the temperament of the wearer, but have suffered for lack of a dependable guide to such judgment. By all means, this temperature-paint idea should be subjected to extensive development.

Outside Activities

ONE of the major oil companies advertises that last year its dealers wiped 129,024,700 windshields, checked 123,863,700 tires, filled 78,834,300 radiators, and checked 47,739,100 batteries. What with performing all these chores and then doing all the paper work of keeping tally and making reports on them, it's a wonder they got around to selling any gasoline and oil.

—*Henry D. Ralph*

DOWELL STRATALIFT *using* JEL-ACID provides an improved method of increasing production by fracturing formations

Jel-Acid, a recent Dowell development, is thickened hydrochloric acid. Forced into sand, dolomite or limestone formations at high pressure, it provides a fracturing effect that forms permanent new drainage channels. This process, called STRATALIFT, has proved highly successful for increasing production in many wells where ordinary acidizing or shooting failed to produce results.

A well completed in the Arbuckle had an initial production of 11 BOPD. A conventional acid treatment, a 10-quart shot of nitroglycerin and a second acid treatment all failed to increase production. STRATALIFT with Jel-Acid was then employed and the well is now producing 91 BOPD, *a 727% increase!*

STRATALIFT has many advantages. Jel-Acid provides the viscous fluid needed for formation fracturing and, in addition, reacts with the soluble part of the formation. Jel-Acid has a wide range of viscosities, easily controlled, making it adaptable to formations of various permeabilities. Further, Jel-Acid will not burn. Finally, Dowell, the pioneer in acidizing, has the right equipment for the job and the long experience needed for the best possible treatment. For complete information on this new development, call your nearest Dowell station or write to Tulsa.

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ACIDIZING SERVICE

Ask your nearest Dowell station for complete information on these Dowell services and products: Acidizing Service, Electric Pilot Services, Plastic Service, Chemical Scale Removal Service for heat exchange equipment, Jelflake, Paraffin Solvents, Magnesium Anodes for Corrosion Control, Saran Rubber for corrosion resistant tank linings and Bulk Inhibited Hydrochloric Acid.

"First in Acidizing . . . since 1932"

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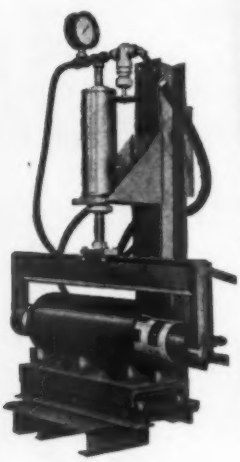
Collar Strap welded to Spring Collar and Stop Collar, connecting them as a unit.
Springs are butt-welded to Spring Collar. No chance for stress under deflection.
Properly contoured springs provide "effective landed centering force" even after being repeatedly flattened.
Ample clearance accommodates increased length of springs when completely flattened.
Stop Rings are plug-welded to casing. Centralizer remains stationary when casing is rotated.
Stop Collars insure Centralizer being PULLED (never pushed) either up or down the hole. No damage to springs.
Spring Collars to which Springs are butt-welded; no rivets or overlapping.
Springs act like sled runners and do not cut into or remove mud or formation.
Arched Collar Straps designed to hold over-all diameter to minimum, permitting rotation in smaller clearances.

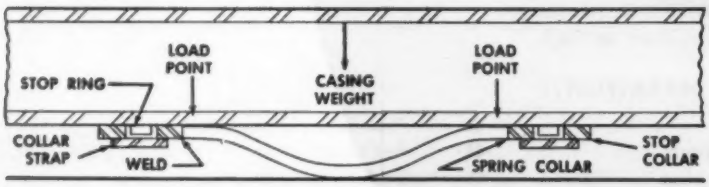
EASY STARTING WITHOUT "SNUBBING"

Testing to determine the maximum number of springs, of optimum bowed height and length, to insure easy starting, particularly of the first few joints when there is no accumulated weight. Minimum interval spacing of Baker Model "G" Casing Centralizers also was determined with this testing equipment.



With this testing device it is possible not only to simulate rugged downhole travel by repeatedly flattening the springs, but also to find the effective centering force of the centralizer in the open hole, after such treatment. The maximum centering force is easily determined from a performance curve showing the centering force at various intervals of deflection.

Operators who know ALL the facts about the Baker Model "G" Casing Centralizer specify and run them exclusively. They know from experience that they are buying the greatest possible centering force for their casing, to be applied *exactly where they want it in the hole*. Isn't that what you too expect and really want from a casing centralizer?



Here is the ideal in spring design and mounting, found only in the Baker Model "G" Casing Centralizer. Note how the load point is imposed directly upon the casing; and how the properly "contoured" spring is free to move along the smooth surface of the casing as it deflects under compression. There is no chance for concentration of stress to cause a permanent set, or to result in breaking of the spring. Note that ample clearance exists between Stop Rings and Spring Collars to accommodate the increased length of the springs which results from their complete flattening.

Additional interesting facts and illustrations are contained in a new 16-page brochure which proves conclusively that no other spring-type centralizer even approaches the EFFECTIVE LANDED CENTERING FORCE afforded by the Baker Model "G" Casing Centralizer. Ask for your copy today from any Baker office or representative.

BAKER OIL TOOLS, INC.
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Iranian Folly

The Iranian people seem intent on killing the goose that lays the golden eggs. They propose to nationalize their oil industry, notwithstanding the fact that as operated by Anglo-Iranian Oil Co., Ltd., it is the basis of their entire industrial economy and despite a current offer of the company to liberalize royalty and other payments.

The move is utterly foolish from the standpoint of Iran itself, for Iranians cannot possibly operate this complex business themselves. For years Anglo-Iranian has conducted schools for Iranians and so far as possible has trained nationals in the practical phases of oil operations. But Iranians have a long way to go in numbers, skills, and technical knowledge before they can administer one of the largest and most involved of petroleum activities.

Other nations, more advanced industrially, have found nationalization a delusion. There are many examples, in oil and other industries, where nationalization caused a long period of decline while government operators attempted to rebuild with their own personnel and resources.

Many Iranians think they would be better off with all the profits of a small operation than with a share of the present setup, but they could end up owning a dead horse. Their foreign credit would be ruined, making it impossible to obtain equipment, and if the British should retaliate by withdrawing tankers and closing markets, Iranian oil would have no outlet.

The United States is not directly involved in this controversy, but it is vitally concerned with its outcome.

A shutdown of Iranian operations would cost the western world upwards of 600,000 bbl. of oil daily, and to make this up from other sources would require a drastic rearrangement of the oil trade of the world and could impose a severe strain on some producing areas. This brings home the hazards of foreign operations and the precariousness of too great dependence on remote oil sources.

But the most serious aspect is the blow to international comity and morality. International law recognizes the right of a sovereign to expropriate property provided there is fair and prompt compensation. It is impossible to conceive how economically impoverished Iran could meet this requirement, and without full payment the seizure is illegal.

All business operations, all international dealings, are based on the sanctity of contract. Here the company has a valid contract to develop the oil of Iran under specific terms. There is no charge that the company violated its side of the contract, yet Iran proposes to abrogate it.

If the law of nations permits such actions it will mean an end to international loans of capital and technology for economic development. Neither the oil business nor the family of nations can exist if agreements are to be nullified at the pleasure of one party.

THIS WEEK

MATERIALS—PAD plans orderly transition of oil industry's catch-as-catch-can method of securing equipment to operation under Controlled-Materials Plan, now that NPA has approved steel supply for tubular goods. . . . ¶Big problem, meanwhile, is acquiring tubular goods which were assigned to industry under Order M-46. . . .

WASHINGTON—Opponents to reciprocal-trade agreements call for their direct end, or, at most, extension of only 1 year instead of 3. . . . ¶Total of 313 certificates for plant expansion under accelerated amortization granted by DPA. . . . ¶OPS officials, industry representatives discuss proposed price regulations for crude and products.

PRODUCTION—Texas' theoretical capacity estimated at 600,000 bbl. daily over April allowable of 2,878,550 bbl. daily. . . . ¶Federal freeze on gulf tidelands operations means it will take 22 years to pay out investments already made. . . . ¶World crude-oil production continued upward trend in January. . . .

INDUSTRY—Case histories of various types of corrosion, methods of prevention discussed at annual N.A.C.E. meeting. . . . ¶Shell Oil president declares domestic industry must add 2,000,000 bbl. daily refining capacity by 1960 to meet products demands. . . . ¶Production of synthetic-aliphatic chemicals reached 15.7 billion pounds in 1950. . . . ¶Oklahoma Supreme Court validates state's compulsory-unitization law. . . .

ECONOMICS—"Flexible frost" on other commodities puts hard-frozen oil price far below "parity" in relation to things oil men must buy. . . . ¶January imports of crude, products averaged more than 1,000,000 bbl. daily. . . .

ACTIVITY—Crude production averaged 5,965,175 bbl. daily for week ended March 17, down 3,125 bbl. daily. . . . ¶Total completions increased 64 wells to 731 for the week. . . . Wildcat completions totaled 174 compared with 126 for previous week and 145 for same week last year. . . . ¶Rotary rigs operating in United States on March 12 increased to 2,177 from 2,097 a week earlier. . . .

TRENDS—Total demand for crude and products in March will set a new record for the month. . . . New supply is estimated at 7,540,000 bbl. daily. . . . ¶If total stocks are depleted at the rate of 100,000 bbl. daily, indicated demand would be 7,640,000 bbl. daily compared with 6,984,000 bbl. daily in March 1950. . . .

CANADA—Bechtel Corp. clarifies its position in relation to proposed crude-oil line from Edmonton to Vancouver. . . . ¶Imperial Oil to install Model IV fluid catalytic cracking unit at Edmonton refinery with capacity of 10,000 bbl. daily. . . .

INTERNATIONAL—Lower house of Iranian Parliament unanimously votes nationalization of oil industry, but whether country will actually take over Anglo-Iranian's operations remains matter of speculation. . . . ¶Kellogg gets contract to erect new Rio de Janeiro refinery. . . .

PIPE LINES—South Atlantic Pipe Lines proposes 254-mile natural-gas line from Jacksonville to St. Petersburg, Fla. . . . ¶Service Pipe Line buys gathering and trunk-line system between Albany and Ranger, Tex., from Humble Pipe Line. . . . ¶National Utilities Co. seeking FPC authority to build 77 miles of natural-gas lines in Michigan. . . .

REFINING—Great Lakes Refining puts new cat cracker on stream at Chicago plant. . . . ¶Great Lakes Pipe Line changes policy on blending of TEL with gasoline transported to shippers through its system. . . . ¶Phillips Petroleum to build $10,000,000 cat cracker with 10,000-bbl. daily capacity at Woods Cross plant near Salt Lake City.

NATURAL GAS—El Paso Natural seeking FPC permit to expand capacity of its system by 400,000,000 cu. ft. of gas daily. . . . ¶Union Gas Co. in Canada appeals to FPC for 18 billion cubic feet of gas annually from United States. . . .

63¢
Cost of crude oil and products, supplies, rents and other expenses.
6¢
Provision for depletion, depreciation, retirements, etc., of properties, plants and equipment.
ONE DOLLAR
16¢
Compensation and benefits to employes including present and future pensions, life insurance, etc.
6¢
State, local, social security and Federal income taxes.
3¢
Cash dividends to stockholders.
6¢
Retained for use in the business.

WHERE THE MONEY GOES.—Annual reports of many oil companies this year lay special stress on explaining what happens to gross income and particularly the need to plow back a large part of earnings into exploration and new facilities. This is how Socony-Vacuum Oil Co., Inc., tells its story in graphic form.

Materials Control

PAD plans orderly transition of industry from present method of securing equipment to operation under new CMP

Bertram F. Linz

WASHINGTON. — The Petroleum Administration for Defense is planning now for the orderly transition of the oil industry from the present catch-as-catch-can method of securing equipment to operation under the Controlled-Materials Plan which is scheduled to go into effect July 1.

Equipment manufacturers will be asked to furnish information on which PAD can set up a program for June and move thereafter into the CMP, which will provide for the allocation of a number of scarce metals. It is expected that in the case of some of these metals 60 per cent or more of the total national production will be set aside for defense-program operations.

Meanwhile, the big problem facing the production branch of the industry is that of getting the tubular goods assigned to it under the M-46 order issued March 12 by the National Production Authority. Current production is materially under the 157,000 tons a month required if the industry is to drill the 43,400 wells programed for this year and is not expected to reach that level before June.

Must stretch supply.—This situation is recognized by Interior Secretary Oscar L. Chapman, who last week warned producers they would have to use "every practical method to stretch the available steel supply in order to bring about the greatest possible recovery of oil and gas."

The action of NPA in making steel available, Chapman said, "indicates recognition of the imperative necessity of developing supplies of crude oil and gas within the continental limits of the United States sufficient to meet emergency conditions and to sustain the development of petroleum reserves in friendly foreign countries."

It is not expected, however, that any formal allocation of tubular goods for foreign operations will be made until the fourth quarter and that it then will be handled under the controlled-materials plan. A minimum of 3,000 wells outside the United States is considered necessary if sufficient foreign oil is to be imported to supplement domestic production to meet United States requirements.

Minimum regulation.—In the hope of keeping governmental direction of the industry to a minimum, PAD will rely upon the state regulatory bodies to provide field-operating conditions under which the steel provided by the NPA order will give a maximum return in oil.

The basis for this was laid at a meeting January 19 between PAD officials and representatives of the regulatory bodies of 18 states, when Richard G. Lawton, PAD director of production, recommended four steps which Deputy Administrator Bruce K. Brown said would bring about the desired end. The program was given general approval by the state officials but it will be up to the authorities in each state to make it effective in their jurisdictions.

Spacing-rule revisions.—Lawton recommended that the states examine their existing well-spacing rules with a view of revising them to permit drilling new wells farther apart where practical, and increasing the allowable from each well. This action, Brown told the meeting, would place greater reserves and productive capacity behind a given amount of tubular goods, but he warned that wider spacing would have to be accompanied by adjustments in allowable-production quotas for individual wells in order to assure operators equitable participation in the total allowable production from each field.

Lawton also urged the increased use of pressure maintenance and repressuring operations in oil and gas reservoirs through operation of reservoirs as single units, in order to maintain maximum efficient rates of production at as high a level as possible for as long as possible, thus increasing ultimate recovery.

The state authorities were urged to examine carefully their field rules and existing practices in the use of tubular goods for drilling wells with a view toward reducing requirements for surface and intermediate-string casing by shortening or eliminating strings of large-diameter pipe or making use of smaller, lighter pipe.

Dual completions urged.—PAD also strongly recommended wider use of dual completions as a means of conserving material.

"Success of this program will depend largely on industry itself as well as the regulatory bodies of the various states," Brown said last week. "We believe that petroleum producers will cooperate with state regulatory bodies and the production division of PAD is working out methods of using tubular goods that will bring maximum returns of oil and gas with minimum expenditures of steel. Industry associations whose membership includes oil and gas producing units likewise can be of great assistance in making the plan work."

Trade Wrangle

Opponents to reciprocal-trade agreements call either for their direct end or extension of only 1 year instead of 3

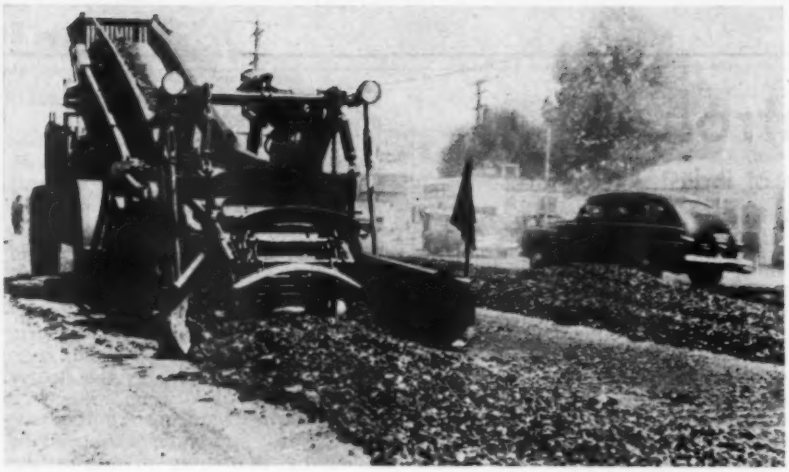
WASHINGTON.—Declaring that the escape clause in present reciprocal-trade agreements is meaningless and ineffective and charging the administration with "a lack of sincerity" in dealing with domestic industries adversely affected by imports, L. Dan Jones, attorney for the Independent Petroleum Association of America, urged the Senate finance committee last week either to let the reciprocal-trade agreement die or at most extend it for only 1 year in place of the 3-year continuance sought by President Truman.

Appearing for Harold B. Fell, executive vice president of the association who had planned to present the organization's views, Jones testified that if the act is extended the peril-point and escape-clause amendments written into it by the House last month should be retained "as a most constructive step in the right direction" to protect the domestic oil, shoe, watch, and other industries that have been badly hurt by imports.

Another objector.—While Jones recommended either abandonment of the trade program or curtailment of the President's power to trade away domestic industries, Robert E. Lee Hall, counsel for the National Coal Association, went much further in an earlier appearance before the committee and urged adoption of an "over-all quantitative restriction" on foreign oil imports.

Congress must provide machinery for restricting residual fuel-oil imports "in quantities that imperil national defense" or create unemployment in the coal industry, Hall declared.

Jones' testimony was largely a repetition of that submitted by the I.P.A.A. to the House ways and means committee in January *(The Oil and Gas Journal, February 1, 1951, page*



Road Rejuvenator

The machine shown here gobbling up broken asphalt, processes it into new road-surfacing material. Developed by Shell Oil Co., the machine pulverizes the old asphalt, which is mixed with Shell's new asphalt softener. This is laid down again, making what the company claims a "better-than-new road surface twice as fast and at half the cost."

32) but he warned the Senate committee not to lose sight of the basic issue of increasing dependence upon foreign sources for oil while our own industry languishes and the fact that the present emergency, with its consequent all-out effort to stimulate production, may serve temporarily to "obscure the evidence of harm and suffering resulting from trade-agreement-program activities."

"Failure".—Jones asserted that expressed objective of the trade program, to promote and maintain world peace, has been a dismal failure and denounced the administration's handling of it, declaring that "the years of experience since the law was first passed have demonstrated that those responsible for its administration cannot be expected to take corrective action.

"Through all of this period under the program there has been evidence of a lack of sincerity on the part of those administering this act," Jones told the committee. "Somewhere, sometime, s i n c e r e administrative agencies must have felt that this law could be improved. Need for some additional authority or direction must have been evident. Yet at no time or place have the agencies responsible asked for amendment giving them more specific direction or clarifying their authority. All they have asked is more life by further extension. They repel all efforts by others to advise amendment.

"Adamant."—"Despite the widespread injury suffered by domestic industry and the most serious concern of large segments of our people as to effects of the trade agreements program the State Department has been unrealistically adamant in its position of no change."

Asking that the act be permitted to lapse or at best be continued for a single year, Jones pointed out that Secretary of State Dean Acheson had stated definitely there is no intention to negotiate new agreements during the next 3 years, which will be a period of consolidation and adjustment in which the trade-agreement countries will test and observe the operation of existing pacts.

"Judging the over-all program from its effects on oil shows that its continuation would be disastrous," Jones said. "In the case of oil the results have been to damage the domestic industry, weaken the economy of more than half of the states, and jeopardize the nation's security by forcing our country to become dependent upon distant and uncertain sources of supply for a vital munition of war.

"If, however, the act is to be extended it is urged that the period of extension be limited to 1 year. The present uncertain world situation is likely to exist for some time. Rapidly changing conditions may require some changes in our course of action. This suggests the necessity for an opportunity to take a relook at this problem at an early date."

Rather Named to PAD

WASHINGTON.—Charles P. Rather, president of Southern Natural Gas Co., Birmingham, was named last week by Secretary Oscar L. Chapman to be assistant deputy administrator in the Petroleum Administration for Defense to be in charge of matters involving transmission and distribution of gas.

At the same time, Chapman announced the resignation of Reginald H. Hargrove as acting assistant deputy administrator and Nelson W. Freeman as acting director of the gas division, who joined PAD temporarily last month to help set the division up.

Rather, who will serve without compensation, has been president of his company since 1938. He is also president of various subsidiary companies, first vice president of the Independent Natural Gas Association of America, and a member of the managing committee of the American Gas Association.

The permanent head of PAD's gas division was appointed simultaneously with the naming by Chapman of 61 members of the natural and manufactured-gas industry who will comprise the newly established Gas Industry Advisory Council. The council will be called for its first meeting in the near future, after problems relating to its organization and structure are ironed out.

Expansion Permits

Total of 313 issued under accelerated amortization

WASHINGTON.—A total of 313 certificates permitting the accelerated amortization of $1,183,424,159 of a much larger sum which 231 companes will spend on new facilities for defense production have been granted by the Defense Production Administration since January 25, including 27 certificates amounting to $101,225,788 for the oil industry.

The average certificate provides for the rapid write-off of 74 per cent of the full cost of the project, which would indicate that the oil industry will spend in the neighborhood of $135,000,000 on its 27 projects.

The issuance of certificates was taken over by the DPA in January, but prior thereto 228 certificates covering defense production expansion projects valued at an estimated $1,500,000,000 were issued by the National Security Resources Board.

Largest certificate.—The largest certificate issued by the DPA for petroleum facilities was in the sum of $18,485,342 for the production of isobutane gasoline by Gulf Oil Corp. at Port Arthur, Tex. Standard Oil Co. of California received a certificate for $14,000,000 for benzene and gasoline at El Segundo, Calif., and Union Oil Co. of California received a certificate for $12,000,000 for gasoline and fuel oil at Wilmington, Calif.

Other permits.—Other certificates which were recommended by PAD and approved by DPA were issued to Rothschild Oil Co., Santa Fe Springs, Calif., for $2,050,000 for production of components for aviation gasoline; Union Oil Co. of California, $4,500,000 for gasoline components; Fletcher Oil Co., Wilmington, Calif., $176,250 for gasoline and fuel oil; Levingston Shipbuild-

WATCHING WASHINGTON

Bertram F. Linz

Big Inch Conversion?

Necessities of a formal war would require either the reconversion of one of the Big Inch pipe lines back to oil service or the construction of a third line along the same right-of-way, but barring such a situation there is little likelihood that anything will be done to disturb the present status of these lines, now carrying natural gas.

Considerable study is being given in Defense Department circles to the fuel position the industrial East might be put in by any interruption of tanker service, but it is emphasized it is all in the field of long-range planning against a possible emergency sometime in the indefinite future.

While conversion of one of the Big Inch lines would involve questions of changes in fuel supplies for the area they serve it is thought in some quarters that the problems would not be as great as they might seem at first glance. It has been suggested, for example, that gas supplies could be brought in by pipe lines tapping other systems running south to north.

Experts admit that the matter is a delicate one and for that reason, they said, there is little likelihood that any action will be taken short of an emergency. Further, whether the action would be along the line of recapturing Big Inch or laying a whole new pipe line would depend upon the time available to meet the situation, availability of materials, etc.

NPC's Status

The Department of Justice has turned down the request of Secretary Chapman that the National Petroleum Council be permitted to remain under an industry chairman while taking the place of an advisory committee to PAD, and while discussions are continuing there is little chance the department will change its mind.

Chapman's argument is that the NPC was set up at the President's direction before the Defense Production Act was passed and therefore does not come in the scope of that law's provision that industry advisory committees of the defense agencies must be headed by a full-time government official.

There is a possibility that Chapman may solve the problem by setting up a small industry advisory committee, say of 25 to 30 members, with a PAD official as its chairman, with which problems could be taken up after the council reviewed them and before the petroleum administration acts.

Coal Industry Squawks

Complaints from the coal industry that it is losing its markets to residual fuel oil would seem to imply that as fuel-oil supplies go up mines close down, but that is not the case.

It is true that in the past 50 years as the contribution of oil and natural gas to the energy supply of the country increased from 7.7 to 55.3 per cent and that of water power increased from 3.2 to 4.9 per cent, the contribution of coal has dropped from 89.1 to 39.8 per cent.

Those figures are impressive, but they don't tell the whole story because in the last half-century our annual consumption of energy has quadrupled. Actually, the production of bituminous coal and lignite, while having its ups and downs reflecting fluctuations in the economy and the vagaries of John L. Lewis, amounted to 599,518,000 tons in 1948 as compared with 166,593,000 tons in 1898, a figure which had been exceeded only twice in the previous history of the industry. Also, the average value per ton of the 1948 output was the highest the industry ever reached and the total value lacked only less than $7,000,000 of hitting the $3,000,000,000 mark. Hardly signs of a dying industry.

Foreign-Trade Control

The National Production Authority is attempting to take a hand in foreign-trade control in an effort to save for domestic manufacturers the market they will vacate under its orders prohibiting the manufacture of nonessential items, but it isn't expected the move will get far.

The emergency agency got into the act when domestic manufacturers complained that they would lose their markets if foreign products were permitted to fill the void created by prohibitions upon their manufacture in this country. NPA officials revealed they had made representations to the State Department that import quotas should be placed on products no longer permitted to be made in this country and an attempt be made to influence foreign governments to institute limitations in their countries similar to orders in effect here.

ing Co., Orange, Tex., $580,000 for petroleum barges; A. L. Mechling Barge Lines, Inc., Mississippi River, $138,000 for oil barges; Wood River Oil Refining Co., Inc., Gary, Ind., $7,086,000 for gasoline and fuel oil; Levelland Refining Co., Levelland, Tex., $2,441,763 for aviation gasoline; Bay Petroleum Co., Chalmette, La., $1,726,500 for gasoline components; Pan American Refining Co., Texas City, Tex., $1,100,000 for benzene.

Petco Corp., Blue Island, Ill., $1,936,000 for fuel oil and gasoline; Atlas Processing Co., Shreveport, $2,600,000 for benzene; M. F. A. Oil Co., Memphis, $1,720,000 for gasoline; Aurora Gasoline Co., and Keystone Oil Co., Detroit, $3,970,000 for diesel and industrial fuels; Sunland Refining Co., Bakersfield, Calif., $501,653 for gasoline and fuel oil; Western Oil & Fuel Co., Duluth-Superior, Minn., $5,992,000 for gasoline and fuel oil; Derby Oil Co., Wichita, $2,606,041 for high-octane gasoline and fuel oil; Ethyl Corp., Baton Rouge, La., $175,000 for antiknock compounds; Phillips Petroleum Co., Phillips, Tex., $4,056,575 for propane and butane; Ben Hur Refining Co., Long Beach, Calif., $2,230,000 for gasoline and fuel oil; Northwestern Refining Co., St. Paul, Minn., $2,074,998 for high-octane gasoline; Superior Refinery Owners, Inc., Superior, Wis., $1,228,800 for gasoline and oil.

Sunray Oil Corp., Stephens County, Oklahoma, $1,750,866 for gasoline components; Pan-Am Southern Corp., New Orleans, $5,500,000 for gasoline; White Fuel Corp., Boston, $600,000 for petroleum-product storage.

NPA Orders

Agency issues rulings on various materials

WASHINGTON.—The following orders have been issued by the National Production Authority:

Order M-46, March 12: Providing steel casing, tubing, and drill pipe for the drilling of oil and gas wells.

Direction 1 to Order M-25, March 12: Providing relief for canners suffering hardship under the limitations on the use of metal cans.

Amendment to Order M-8, March 12: Placing all domestic users of pig tin under allocation control effective May 1.

Amendment to Delegation 7, March 14: Empowering 11 additional NPA field offices to act on applications for authorization to commence commercial construction.

Direction 1 to Order M-12, March 14: Permitting companies which experienced shutdowns of more than 15 consecutive days during the first half of 1950 to make automatic adjustments in their base-period consumption of copper and copper-base alloys.

Amendment to Order M-1, March 15: Increasing the percentage of steel mill production to be set for defense orders.

Amendment to Order M-6, March 15: Assuring a continuing flow of carbon-steel products to warehouses, sufficient to give them a minimum of 85 per cent of their average monthly base period receipts.

Order M-45, March 15: Providing for the allocation of chemicals.

Ark-La-Tex Measurement Society

More than 100 oil-industry men attended the March meeting of the newly organized Ark-La-Tex Measurement Society, Shreveport, to hear Earle Pitt, of Foxboro Co., discuss fundamental principles of orifice meters. Formed with only 10 members last December, the society now boasts 140 members, and meets monthly to extend and disseminate measurement knowledge. Don Attaway, Arkansas Fuel Oil Co., Shreveport, the group's president, reports that more than 20 per cent of members see actual equipment and demonstrations at the meetings for the first time. A national society is being planned, with local chapters to be established in various sections of the United States.

Depletion Sidelight

Solons debate with C.I.O. official on radio forum

WASHINGTON. — Whether the oil industry avoided the payment of more than $1,000,000,000 in taxes in 1946 and 1947 by reason of the depletion allowance or whether the 27½ per cent depletion deduction made it possible for the Armed Forces to get their oil needs without civilian rationing was fought out last week by Stanley Ruttenberg, director of research and education for the C.I.O., and Sen. Robert S. Kerr, of Oklahoma, and Reps. J. H. Combs, of Texas, and Hale Boggs, of Louisiana.

The four men were brought together for a broadcast debate by Sarah McClendon, Washington newspaper correspondent. The two congressmen, who are members of the House ways and means committee, now considering changes in the depletion allowance and other taxes, joined with Kerr in rebutting Ruttenberg's charges that it is a method of tax avoidance.

C.I.O. position.—Ruttenberg disclosed that the C.I.O. position is that producers should receive only the same depreciation allowance that other industries get, charging that the small operator does not benefit from depletion deduction and asserting that 75 per cent of the $1,400,000,000 taken in 1946 and 1947 went to corporations with assets of $100,000,000 or more. He asserted that the oil companies had a return of 33⅓ per cent in 1948, but Combs produced Treasury figures showing the return was only 8 per cent and among the lowest for any major industry.

Defends law.—"All geologists agree that Russia now has more potential oil production than America has," Kerr declared. "If Russia had the American oil industry today and we didn't have it, she would rule the world. But we could not have it today nor could we maintain it without the depletion allowance. Today we are having to pay through the nose for 71 critical materials in short supply which cannot be had in the western world. But the American oil industry through the depletion allowance which Congress was wise enough to establish has enabled the development of oil reserves. We can have the oil for war so long as the depletion allowance is kept."

DPA Functions Clarified

WASHINGTON.—Functions of the office of program and requirements of the Defense Production Administration were spelled out last week by Administrator William H. Harrison.

Director of the office will be Charles E. Wampler, of New York, on leave from American Telephone & Telegraph Co., who will be responsible for determining basic policies and programs for the allocation and utilization of resources required to meet military, civilian, and foreign needs.

Duties of the office include the analysis of over-all data on requirements and resources; program evaluation and the authorization of programs to meet defense production needs and essential civilian requirements; allocation of resources to support approved programs; and identification of deficiencies in the supplies of materials and other resources and recommendation of programs for the more efficient utilization of available resources and for their expansion.

Wampler will have as assistant directors Melvin Anshen, professor of marketing at Indiana University School of Business and from 1942 to 1946 on the War Production Board; George H. Lilygren, vice president of Carrier Corp.; and J. J. Scanlon, assistant controller of Bell Telephone Co. of Pennsylvania. The program-requirements staff will be directed by Robert E. Johnson, economist of the Western Electric Co. and during the war director of the military requirements division of the War Production Board, and the planning staff will be headed by Glenn McLaughlin, formerly director of the National Security Resources Board office of resources and requirements and also on the staff of WPB during the war.

Price Controls Discussed

WASHINGTON.—Price-stabilization officals met with industry representatives last week in a series of discussions of proposed price regulations for crude oil and products which are expected to be issued within the next few weeks.

Among the groups called in were producers of crude, liquefied petroleum gas, natural gas, natural gasoline, and asphalt. Other groups to be consulted will include producers of lubricating oils and marketers. Five orders are being readied by the Office of Price Stabilization to cover the industry from the producer of crude to the retailer of products.

At a meeting with the crude-oil industry, advisory-committee officials said the proposed regulation for producers will give them some slight price adjustments to correct inequities created by the General Ceiling-Price Regulation but otherwise crude prices will remain frozen and there is no chance of a general price increase.

The proposed orders will be temporary in nature and eventually will be superseded by regulations providing specific dollar-and-cents ceiling prices for oil and products along the pattern followed by the Office of Price Administration during World War II.

An advisory committee on L.P.G., natural gasoline, and natural gas was told the regulation for that group will be designed to eliminate price distortions created by the failure of the GCPR to take account of the peculiar nature of the industry, such as contracts for natural and refining gases which run for periods as long as 15 or 20 years.

SOUTHWEST

Texas Reserve Capacity

Potential capacity of 600,000 bbl. daily over April's 2,878,550-bbl. daily allowable is estimated by Murray

AUSTIN.—Texas has a theoretical potential reserve capacity of 600,000 bbl. daily over and above the new April allowable of 2,878,550 bbl. daily, William J. Murray, Jr., of the Texas Railroad Commission, estimated at the state-wide allowable hearing here last week.

He said he believed a firm figure of approximately 300,000 to 350,000 bbl. daily was about all the extra oil that could be produced in a "pinch."

Murray, stating that most of the United States' reserve capacity is located within the State of Texas, declared that the commission had to remember that Texas is the "reserve supply" in case of a national emergency.

"Some engineers," he said, "believe most Texas fields could operate only 26 days monthly without waste. We hate to use up the last reserve we have short of dire emergency. We'd be hard-pressed for oil soon if we slowed down our drilling program. If we cut off all our imports, this nation's supply would be short now about 250,000 to 500,000 bbl. daily."

Output.—With April's allowable set at 2,878,550 bbl. daily compared with the previous record limit of 2,823,720 bbl. daily set last September, the state will thus have an increase of 76,397 bbl. daily over the existing allowable March 10.

The largest production increase was given West Texas (District 8), which was granted 32,625 bbl. daily more, to total 974,880 bbl. daily. Texas fields generally will continue the 23-day production schedule set in March. This will in effect permit hiked production because of the 30 calendar days in April as compared with the 31 days in March.

East Texas.—East Texas field was ordered to continue on its current 19-day production basis. Fullerton field was increased from 19 to 23 producing days, and Willamar and Pantex fields were assigned 12 and 14 days, respectively, their current allocation.

Natural-gasoline and condensate-production estimate in April was set at 366,100 bbl. daily. This is in addition to the crude-oil allowable.

Requests.—Humble Oil & Refining Co. and Magnolia Petroleum Co. requested a 23-day producing schedule for Texas fields generally, and 18 days for those in East Texas. A spokesman for Sun Oil Co. said the firm's withdrawals from storage were exceeding intake by 8,500 bbl. daily, and in April would show a difference of 12,000 bbl. daily. He requested a 24-day schedule for the state at large, and 18 days for East Texas.

Four independent refiners reported they were unable to buy crude oil at present, and asked for substantial increases in crude and working stocks.

Drilling permits.—The commission, in an effort to conserve steel during the defense emergency, enlarged upon its order issued during the state-wide proration hearing in Fort Worth last month, which requires operators to receive permission before they can drill a well, effective as of March 15.

The new order permits only one well to each proration unit, placing drilling on a density basis and not just on spacing. It specifies there must be the required acreage in each proration unit, as well as the test being authorized to permit flexibility in locating wells.

The operators are required also to submit with each drilling-permit application a certified unit plat showing the acreage dedicated to each proposed test. Exceptions to the order can be obtained through channels previously required by the commission. The rule is effective as of March 15, and will become permanent during the emergency unless there are protests.

The next state-wide oil-proration hearing will be held in Austin April 18, the commission's chairman, Olin Culberson, announced.

TEXAS CRUDE-OIL ALLOWABLE

(For April, with increase from March 10)

District—	April	Inc.
1. Southwest	36,782	433
2. Southwest	169,188	4,947
3. Gulf Coast	502,572	11,458
4. Southwest	264,764	6,729
5. East-Central	52,334	1,492
6. Outside East Texas	115,696	3,081
6. East Texas	280,354	8,543
7b. West-Central	97,800	1,893
7c. West-Central	92,267	2,140
8. West Texas	974,880	32,625
9. North Texas	186,518	3,050
10. Panhandle	105,393	4
Totals	2,878,548	76,395

TECHNOLOGY

Corrosion Study

Case histories, various types of corrosion, methods of prevention discussed at seventh annual N.A.C.E. meeting

George Weber

NEW YORK.—Corrosion, which exacts an estimated toll of 6 billion dollars in this country every year, came up for intensive study last week as 1,266 members of the National Association of Corrosion Engineers met here for their seventh annual meeting.

The pipe-line and producing divisions of the petroleum industry were prominently represented on the 4-day program of technical and committee sessions. Case histories of two types of pipe-line protection programs, and two types of oil-well corrosion heretofore relatively unrecognized, highlighted the technical sessions for oil-industry engineers.

Coating study.—Donald E. Miltner, Socony-Vacuum Oil Co., Inc., Wichita, presented a thorough report on the condition of a 335-mile 10-year-old products line of asphalt-mastic-coated pipe. The company's 6⅝-in. Topeka-Sioux Falls, S. D., line, the longest and oldest of its kind in the Mid-Continent, was subjected to close inspection in the summer of 1950 The line was originally laid in 1941 with a ⅝-in. coating of asphalt-mastic. The line was equipped with five cathodic-protection rectifiers which gave protection to approximately 90 per cent of its length.

Methods used.—Three methods for examination were used: an electronic survey for determining coating discontinuities, excavation and visual examination of a representative number of coating failures, and over-all coating-conductance tests. After traversing the entire line with the electronic survey, operators found a total of 204 discontinuities. Of these, 46 were test leads with faulty coating. About 20 per cent of the total were classed as strong, 57 per cent moderate, and 23 per cent weak.

Forty out of the 204 were inspected, including 80 per cent of these classed as strong. Of these, 21 were found to be the result of friable mastic and 7 were caused by tool abrasions. Some discontinuities turned up on the elec-

tronic survey were not evident from visual inspection.

Altogether, discontinuities due to faulty coating were found on the average of only one per 4 miles, or, of the 3 million square feet of coating on the line, only 50 sq. ft. were found damaged—evidence of a high quality of coating, Miltner said. Cathodic protection was found to have adversely affected the immediate area of coating breaks, but did not affect areas of sound coating. No effects of soil stress were found.

Bare-line protection.—D. C. Glass, Pure Transportation Co., Chicago, reported on the economics of rectifier installations for cathodic protection of a bare pipe line. He stressed that the findings on Pure's 10¾-in. o.d. 211-mile crude line from Van to Smith's Bluff, Tex., should not be assumed as applying generally, and that cathodic protection cannot be installed without precise economic studies of each proposed installation. The 0.307-in. wall thickness, 34.24-lb. per foot electric-welded pipe was considered of sufficient wall thickness to obviate the necessity of coating. An 18-mile section subjected to seasonal flooding in the Gulf Coast area began showing leaks in 1936, 6 years after laying. Leaks continued along that section, and in 1940, after careful surveys were made, 50 cathodic-protection units fed from a 2,300-volt parallel line were installed at the rate of about three to a mile.

Initial costs.—Initial cost on the basis of 1939 prices was $46,241.45. Total maintenance and replacements, including ground-bed repairs during the 11-year period 1940-50, cost $50,159.16. Power cost for the same period ran $10,870.58, for an 11-year total cost of $107,271.19, or $1.129 per foot protected or $45.12 per mile per month.

Glass concluded that:

1. It is economically feasible to extend the service life of bare 10-in. pipe by use of cathodic protection.

2. A substantial saving can be realized in the operating cost of new lines by use of minimum-weight pipe designed for maximum operating pressure, with the exterior properly coated when the line is laid, and with proper application of cathodic protection.

3. Cathodic protection of bare pipe under conditions as discussed is effective in reducing the number of leaks.

4. The design of a cathodic-protection system for bare pipe should not be based upon the performance of a single-test installation.

5. To develop a basis for a sound corrosion-prevention program it is desirable to make a complete survey and start several field trials as soon as a line is laid.

Bacterial corrosion.—Severe, localized exterior-casing corrosion encountered in oil wells in the Ventura, California, field are almost certainly caused by the action of anaerobic, sulfate-reducing bacteria, said Keith Doig and A. Wachter, of Shell Oil Co. and Shell Development Co., respectively. In a 7-year period since the first leaks developed, a total of 40 well casings have failed. Extensive examination of wells led to the elimination of all possible causes except bacterial action.

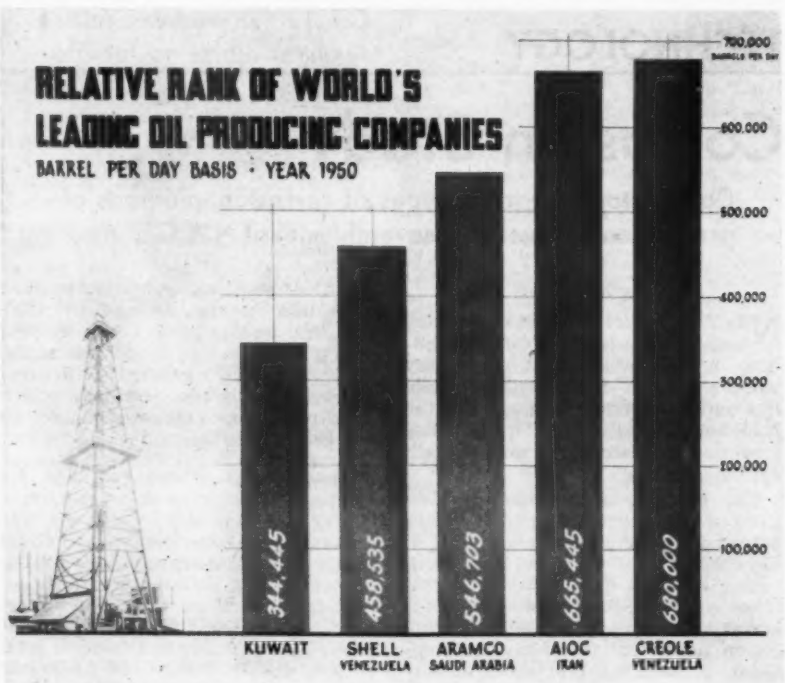
Samples of recovered casing showed no significant internal corrosion, no pipe faults, and a low pH mud cake which contributes to bacterial action. Scale samples showed the presence of the sulfate-reducing bacteria and ferrous sulfide. Blame is laid to the low pH mud used in drilling wells since 1938, as all wells affected were completed since that date. Central storage of mud was employed in the field, and the storage reservoir was found badly contaminated with the organisms.

Little hope.—Engineers hold out little hope of arresting the damage in existing wells, due to the inaccessibility of the cemented casing exterior, but plan to try the application of a strong electrical current to localized sections in the hope of electrolyzing the environment behind the casing and raising the pH value.

A high pH environment is known to arrest, if not destroy, these bacteria, and the company has adopted the preventive program of drilling all future Ventura wells with drilling mud showing pH of about 10 to 11. Bacteriacides were considered for use in drilling fluid, but since those tested had a deleterious effect on the mud, resorting to high pH was considered sufficient to forestall bacterial corrosion in future wells.

High-pressure corrosion.—More bad news for producers was contained in a paper presented by H. L. Bilhartz, of Atlantic Refining Co., Dallas. A thorough study of corrosion in the Bayou Sale area of southeastern Louisiana has revealed that high-pressure sweet-oil wells appear to be subject to the same type of corrosive attack as high-pressure gas-condensate wells. The trouble, first discovered in 1945, was climaxed by a blowout in 1948 which resulted in total loss of a $150,000 well. Depth, pressure, and temperature were found to be factors, but surprisingly, the presence of water had no bearing on the effect of corrosion, as wells producing pipeline oil were severely attacked.

Remedial measures.—Remedial measures are under study. Thermoplastic-coated tubing is moderately successful.



World's Biggest Crude-Oil Producers

This chart, one of several used by R. I. Brougham, Arabian American Oil Co. vice president, during a talk on Middle East oil in New York City recently, shows the leading oil-producing companies, in terms of total number of barrels on a per day basis during 1950. Creole Petroleum Corp. produced the most, 680,000 bbl., while Anglo-Iranian Oil Co., Ltd., now in a precarious position in Iran due to the tense political situation, was second-highest producer.

High-cost 9 per cent nickel steel has been used for 12 months which allows no conclusive data yet. Nickel-plated tubing may prove economical, but supplies are now unavailable.

Inhibitors are classed as not too successful to date, mainly because of the difficulty in injecting them to the bottom of the tubing. Stick-type inhibitors promise some encouragement, and in the discussion which followed the paper, the opinion was aired that over a period of time, wells could be saturated with inhibitor by period circulation. To maintain such saturation requires only periodic injection of inhibitor whose effect is long-lasting.

While the Bilhartz paper concerned only southeastern Louisiana, it was brought out later that similar corrosion has been noted in other high-pressure oil wells, particularly those nearby condensate wells. Katy, Galveston Bay, and other South Louisiana and Mississippi fields have shown this type of corrosion, and it is expected that the damage may prove greater than heretofore realized. Solution of the Bayou Sale problem will be watched with interest in view of the trend toward more deep high-pressure production.

Scur - crude corrosion. — Sour - crude corrosion in Kansas, and the best means for its control to date, were reported by L. C. Case, of Gulf Oil Corp., Tulsa. Wells producing on the average, 1 to 2 per cent of H_2S and less than 1 per cent of CO_2 have not been helped much by application of caustic, naphthenic acid, or barium chloride. Formaldehyde has proved about 58 per cent effective in preventing corrosion, and oily inhibitors, regardless of water production, have shown themselves 55 per cent effective, Case said. He concluded that while this record showed definite improvement, it was not yet satisfactory and better protection at lower cost was desired.

New officers.—N. E. Berry, of Servel Inc., Evansville, Ind., was elected president of the association, succeeding Vance N. Jenkins of Union Oil Co. of California. M. G. Fontana, of Ohio State University, is the new vice president, and R. A. Brannon, of Humble Pipe Line Co., Houston, was reelected treasurer.

The Whitney Award for 1951 was given to Herbert H. Uhlig in charge of the Corrosion Laboratory, Massachusetts Institute of Technology and the recipient of the Speller Award this year was Kirk L. Logan, research associate of Cast Iron Pipe Research Association, Washington, D. C.

INDUSTRY AFFAIRS

Refining Increase

Burns says it is needed to meet products demands

Dahl M. Duff

NEW YORK.—The domestic petroleum industry must add at least 2,000,000 bbl. daily refining capacity by 1960 to meet a demand for products expected to be possibly 47 per cent higher by that time, H. S. M. Burns, president of Shell Oil Co., said here last week.

In a talk before the New York Society of Security Analysts, the Shell executive said the growth trend in the demand for petroleum products is still in its expansion phase and that there is as yet no indication of a turning point.

1951 demand.—In 1951, domestic demand is likely to vary between 6,900,000 and 7,100,000 bbl. daily, thus showing an increase of between 6½ and 9½ per cent, he said. "Provided reasonably prosperous conditions prevail, a domestic-demand level of 8,000,000 bbl. daily or more by 1955 and 9,000,000 to 9,500,000 bbl. daily by 1960 seems to be within the realm of possibility," he added. "And in saying this, I am in no way assuming continued boom conditions."

The demand forecasts presented by Burns were somewhat above the quite substantial increases which have been given in other recent predictions. He pointed out that the 1950 demand of 6,499,000 bbl. daily was 79.3 per cent higher than a decade ago.

Warning issued.—As have other industry leaders, Burns warned of the necessity of continued large-scale expansion of facilities. A multibillion dollar investment is required in the refining branch alone, and corresponding buildups must take place in other phases of the industry's operations.

He deplored the current effort of the Government to reduce the depletion allowance as "short-sighted" at a time when the nation is facing the necessity of adding considerable reserve additional producing capacity. "Healthy" volume increases probably will be shown by the country's oil companies in 1951, he said, and as a result, higher net income before taxes can be expected. However, it would be "imprudent" to count on the net after taxes reaching the 1950 level.

Shell operations. — As far as Shell's own operations are concerned, Burns said that since 1947 the amount of charge into the company's refineries has increased 21.6 per cent in contrast to an increase by the industry as a whole of 12.7 per cent. He predicted the company's 1951 production and runs would set new records. Crude output, he added, dropped to 175,000 bbl. daily in March 1950 but is now about 220,000 bbl. daily, with some 30,000 bbl. daily of natural-gas liquids in addition.

He said the increase anticipated in sales volume would require an integrated-expansion program in the near future and that the company will devote its efforts to meeting demand in its own presently existing sales areas. Among the measures being taken by the company to provide needed increased facilities is a project for a boost in capacity of the Wood River refinery to 170,000 bbl. daily.

Synthetic Chemicals

Aliphatics output in 1950 was 15.7 billion pounds

NEW YORK. — Synthetic aliphatic chemicals from petroleum and other sources reached an estimated total production of 15.7 billion pounds in 1950, H. B. McClure, vice president of Union Carbide's Carbide and Carbon Chemicals Division, reported to the National Federation of Financial Analysts. Of that total, about 70 per cent originated from petroleum and natural gas, he said, the remainder coming from coal and the fermentation of farm products.

The 1950 figure contrasts with a production of about 8.9 billion pounds in 1945, of which roughly 50 per cent were petrochemicals. The estimates of 1950 production of aliphatic intermediates does not include carbon black, aromatics such as benzene, toluene, and the xylenes, nor such inorganic petrochemicals as ammonia and sulfur compounds. The estimate was obtained by noting the percentage increase of 10 of the larger-tonnage aliphatic "building block" chemicals over the last 5 years.

Intermediates.—The same percentage gain assigned to all aliphatic intermediates gave the 15.7-billion-pound total. This includes some pyramiding, as production of certain chemicals is added to that of their derivatives. Since the problem of determining total "net" production of synthetic organics is practically impossible, the totals of miscellaneous acyclic chemicals as reported yearly by the U. S. Tariff Commission is accepted as a "gross" production figure. The net production of intermediates is estimated by some to amount to 50 per cent of the gross figure. The ultimate total production of finished synthetic chemicals derived partly or wholly from petroleum is a much greater figure than that quoted by McClure.

Chemical usage. — In analyzing the end uses to which the synthetic petrochemicals and other synthetic ali-

phatics are put, McClure gave the following breakdown:

	Per cent
Textiles	21
Automotive	19
Plastics and resins	19
Surface coatings	9
Food	5
Metal processing	5
Rubber	2
Pharmaceutical	3
Miscellaneous	17

Of these principal commodity classes involving the use of aliphatic chemicals, he showed the following 5-year growth:

	1945	1950	Inc. (%)
Registered automobiles and trucks	31	49	60
Pounds of cellulose acetate rayon made	214	444	109
Pounds of plastics and resins made	800	1,600	100
Sale of paints, varnishes, lacquers, etc.	$700	$1,200	70
Pounds of synthetic detergents made	160	1,020	540

Automotive use.—The growth of automotive use, with a more rapid expansion in the synthetic-textile, plastic, and detergent industries, form a background for continued increases in the demand and production of the aliphatic synthetics, said McClure. With adequate reserves and a cost stability not shown for agricultural raw materials, the participation of petroleum and natural gas as basic materials for the expanding aliphatic chemical industry will continue to increase, said McClure.

WEST COAST

Crude Blending Planned

LOS ANGELES.—To facilitate movement of the 11° to 14°-gravity crude produced by San Ardo producers, General Petroleum Corp. plans to pipe light oil into the field, blend it with the heavy crude and then pump the combined oils back to a loading terminal.

Light oil will be pumped from a tanker terminal at Estero Bay to the field through a 4-in., 42-mile line. The lightened crude will then be returned to the terminal through a parallel 8-in. line. Pipe for the project largely will be obtained by taking up General's now idle Lebec-to-Mojave line. Pumping stations and tankage on this old line likewise will be moved to the new location. Contract for this work is to be announced in the near future.

General Petroleum recently signed a long-term contract to purchase San Ardo crude produced by North American Consolidated Oil Co. and Jergins Oil Co., principal operators in the field. Discovered in 1948, the field has had only a limited outlet to date. Last year, because of the statewide oversupply of heavy crudes, the field's approximately 40 producers were shut in most of the time. With a pipe-line outlet now in view, development activity has been renewed.

New Cat Cracker to Be Built

LOS ANGELES.—As part of a long-range modernization and expansion program Union Oil Co. has announced it will construct a new fluid catalytic cracking unit at its large refinery here. The unit will have a feed capacity of 28,500 bbl. daily and will increase the plant's yield of motor gasoline as well as its output of aviation fuel.

The new cat cracker will be of conventional Universal Oil Products design and will be constructed by Arthur G. McKee & Co. Work will start within a few weeks.

In addition to the cat cracker, Union also announced it is planning the installation of a new 40,000-bbl. crude topping and vacuum distillation unit. Besides furnishing additional feed stocks for the new cat unit, this facility would substantially increase the refinery's yield of asphalts.

MID-CONTINENT

Unit Law Validated

Oklahoma Supreme Court upholds "correlative rights" in compulsory unitization law attacked by royalty owners

OKLAHOMA CITY.—The constitutionality of Oklahoma's compulsory-unitization law was upheld by the state Supreme Court March 20 after lengthy litigation.

The law had been attacked in the courts on the ground that it did not provide sufficient consideration for the interests of royalty owners, and its fate has been in doubt for many months.

The chief point of the decision is that the police power of the state extends to correlative rights of the owners of oil in the ground and that regulation of production in a manner to preserve these rights does not violate the state constitution.

The majority of the court held that the legislature is the sole judge of the method to be used in achieving the objective and so long as the Corporation Commission acts within the law and is not arbitrary or capricious the courts should not upset a unitization order on the ground that some other method might have been better.

Revision considered.—With the constitutionality of the law under attack, Oklahoma producers considered revision to meet the objections of royalty owners, and hearings have been held on this subject by a legislative committee. One suggestion under consideration is an amendment providing that a unitization order is to become effective if approved by at least 51 per cent of the royalty interests.

The law, known as House Bill 339, has been in effect since July 19, 1945, and eight oil fields have been unitized under its provisions. It permits the Oklahoma Corporation Commission to order unit operation of a field as a conservation measure under certain conditions, including approval of lessees of 85 per cent of the unit area.

The court's decision, reached by a vote of five to four, came in a case styled Palmer Oil Co. vs. Phillips Petroleum Co. (Docket No. 33336).

Considered a model.—Oklahoma's unitization statute has been considered something of a model, and attempts have been made to enact similar laws in other oil-producing states. It had its origin in overproduction of the Wilcox zone of Oklahoma City pool in 1938-40, and received support of most of the oil industry in 1945 when need for unitization became apparent in West Edmond, West Cement, and other Oklahoma fields.

The law authorizes the Corporation Commission, after notice and hearing, to order unit operation of an oil pool when requested by the lessees of 50 per cent or more of the area to be unitized. Unitization is limited to a single common source of supply, and fields discovered more than 20 years before the effective date of the act are excluded.

A protest period is provided during which a unitization order may be set aside if protested by lessees of 15 per cent of the included area. This provision was considered to be a protection to royalty owners and owners of small interests, and supporters of the law contended that this gave sufficient insurance that the unitization plans would be fair and reasonable.

Hearing required.—A general hearing before the commission is required, open to all parties of interest, including owners of overriding royalties, oil and gas payments, carried interests, and mortgages. The commission's order is required to include such terms and conditions as are shown by the evidence "to be fair, reasonable, equitable, and which are necessary and proper to protect, safeguard, and adjust the respective rights and

obligations of the several persons affected."

Unitization orders issued by the commission cover these pools:

West Edmond Hunton lime field, 30,000 acres in Oklahoma, Logan, Kingfisher, and Canadian counties.

West Cement Mendrano field, 3,000 acres in Caddo County.

Southwest Antioch Gibson sand field, 3,000 acres in Garvin County.

Chitwood Cunningham sand, 1,300 acres in Caddo County.

Chitwood Spiers sand, 1,500 acres in Grady County.

Chitwood Boatwright sand, 1,350 acres in Grady County.

East Edmond Bartlesville sand, Oklahoma County.

Wewoka Lake Beach sand, Oklahoma County.

Others authorized.—In addition, during the past few weeks the commission has authorized the utitization of the Hoxbar sand-Conglomerate of Elk City pool in Washita and Beckham counties; Northeast Elmore Third Deese sand in Garvin County: and Bartlesville sand of East Edmond South field in Oklahoma County. Several other unitization orders are pending at present.

GULF COAST

Societies May Form Group

HOUSTON.—An association of Gulf Coast geological societies which was first proposed by Leslie Bowling, of the New Orleans Geological Society is in its formative stages. The new organization would consist of nine local geological societies, which are already functioning, as follows: Corpus Christi, Houston, South Louisiana, San Antonio, East Texas, Shreveport, New Orleans, Mississippi, and South Eastern.

The two major purposes of the association would be to hold an annual meeting and to establish a means of publication in order that papers of interest may be quickly available in printed form.

Monsanto Expanding

TEXAS CITY, Tex.—A new acrylonitrile plant and additions to styrene-producing facilities are scheduled for construction this year by Monsanto Chemical Co. here.

For the manufacture of acrylonitrile, an important basic for new synthetic-textile developments, the company is understood to be planning to synthesize acetylene from natural gas, by the partial-combustion process. If these plans are followed, the Texas City installation will be the first of its kind.

ECONOMICS

Petroleum Prices

Present condition of firmly frozen prices, "flexible frost" on other commodities puts oil far below "parity"

John C. Casper

THE present condition of firmly frozen petroleum prices and a "flexible frost" on most other commodities has put oil far below "parity" in relation to things oil men must buy.

A barrel of petroleum and petroleum products will trade out less in the general wholesale commodity market than at the beginning of the Korean fighting and even less than in 1949 when some divisions of the industry were feeling the pinch of lower prices and others were operating at reduced output rates. These conditions are shown by the wholesale price index numbers compiled by the Bureau of Labor Statistics, Department of Labor.

Since wholesale price indexes are calculated with 1926 prices taken as 100, the comparison of any commodity group with the total for a particular year will be affected by the commodity price relationships in the base year. However, the changes in the ratio of any commodity to the total from year to year will reflect relative changes in wholesale prices of that commodity.

Important trend.—It is not too significant that the ratio of the petroleum and product index to the all-commodity index in February 1948 was 75.6 per cent, since that number is influenced decidedly by the relative level of petroleum prices for 1926. The important trend is shown by the drop in the ratio from 75.6 per cent in February 1948 to 71.0 per cent in September 1949 and to 67.3 per cent by December 1950.

Each drop in this ratio means that oil men must sell a greater volume of crude and products to have the same buying power in the general wholesale commodity market.

The lowering of the relative position for crude and products in 1949 was due to greater price decreases for crude and products than for total commodities. Most of the reduction was in product prices, but even the average for crude was lowered by cuts in postings for heavy and lube-producing crudes.

Korean effects.—The further lowering of the ratio by the end of 1950 was brought about by the very rapid increase in general wholesale prices. Petroleum product prices were raised in 1950 and specialty-crude prices regained some of the ground lost in 1949, but the over-all increase was less than gains for other commodity groups included in the total index.

Much of the loss in relative position has come about since the Korean crisis. All-commodity prices moved up 11.4 per cent in the last half of 1950 compared with a gain of 3.6 per cent for petroleum and products. The bar chart shows the percentage gains for selected groups of commodities between June 1950 and December 1950. The small increase for motor vehicles does not include the price rise allowed since the first of the year.

Operations in the petroleum industry during World War II were ham-

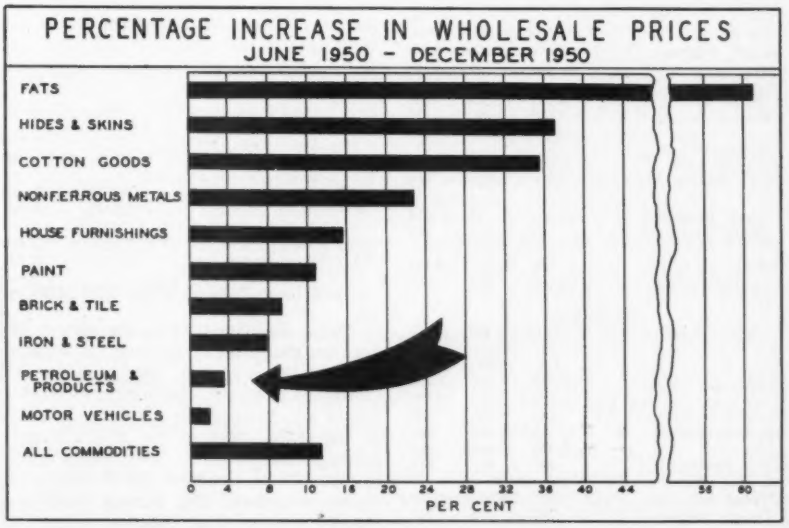


Chart showing percentage increase in wholesale prices.

pered by lower-than-average prices, and the figures indicate that the industry would have been in a relatively better position in the general wholesale market if all prices had been rolled back to June 1950.

RATIOS OF WHOLESALE PRICE INDEXES* PETROLEUM AND PRODUCTS VS. ALL COMMODITIES
(Expressed as per cent)

	1948	1949	1950
January	72.8	75.5	72.2
February	75.6	75.1	71.6
March	75.5	73.2	71.1
April	74.8	72.2	71.6
May	74.5	71.1	72.2
June	73.5	71.5	72.4
July	72.4	71.8	70.9
August	72.0	71.7	70.2
September	72.4	71.0	69.5
October	74.3	72.2	69.8
November	74.9	71.6	68.8
December	75.2	71.8	67.3

*Price indexes from Bureau of Labor Statistics.

Imports Gain

January average was over a million barrels daily

IMPORTS of crude and petroleum products averaged 1,005,000 bbl. daily for the month of January, according to data of the Department of Commerce. This is the first month for which the average was greater than a million barrels daily. The daily average for all oils represents an increase of 7.7 per cent over the previous record of 933,000 bbl. daily, set in December 1950.

Crude imports averaged 522,000 bbl. daily compared with 490,000 bbl. daily for the previous month and 534,000 bbl. daily for January 1950. The greatest gain over December was in

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	Jan. 1951	Dec. 1950	Jan. 1950
Crude—			
Mexico	1,125	1,100	685
Colombia	1,568	1,339	1,389
Venezuela	9,252	8,118	10,857
Iran	...	...	123
Kuwait	2,274	2,864	1,892
Saudi Arabia	1,760	1,763	1,483
Other	213	1	108
Total crude	16,192	15,185	16,537
Daily average	522	490	534
Products—			
Residual fuel	13,842	12,689	10,096
Other products	1,117	1,057	858
Total products	14,959	13,746	10,954
Daily average	483	443	353
Total all oils	31,151	28,931	27,491
Daily average	1,005	933	887

EXPORTS*
(Thousands of barrels)

	Jan. 1951	Dec. 1950	Jan. 1950
Crude	2,913	2,917	2,130
Gasoline	1,125	2,104	1,178
Distillate fuel	660	795	649
Residual fuel	663	1,326	843
Lube oils	1,163	1,426	941
Other products	493	801	515
Total all oils	7,017	9,369	6,256
Daily average	226	302	202

*Excludes shipments to territories.

receipts from Venezuela, but the total for January was 1,600,000 bbl. less than for January 1950. Most of the crude classified as "other" was received on the West Coast from British Borneo. Crude from Canada, amounting to 445 bbl., is also included as "other."

Resid.—Residual imports were 37,000 bbl. daily greater than in December to set an all-time record of 546,500 bbl. daily. The average for the month represents an increase of 37 per cent over January 1950. Imports of other products gained 5.7 per cent over December and 30.2 per cent over the same month last year.

Exports for January averaged 226,000 bbl. daily compared with 302,000 bbl. daily in December and 202,000 bbl. daily in January 1950. Decreases from December were reported for all major classifications with gasoline accounting for the greatest loss.

PETROCHEMISTRY

Petrochemical Output

On basis of preliminary 1950 production for selected chemicals, upward trend appears to be continuing strong

George Weber

NEW YORK.—On the basis of preliminary 1950 production figures for selected chemicals, the upward trend in petroleum chemical output appears to be continuing strong. A report just released by the U. S. Tariff Commission listing 41 synthetic organic chemicals shows a general increase in volume over 1949.

The production of a selected 10 synthetic organics derived in part or wholly from petroleum and natural gas runs about 23 per cent over that for 1949. Part of this increase may be attributed to increased petrochemical output, but how much cannot be determined at this time. Statistics on basic chemical production from petroleum and natural gas will not be compiled until April or May this year.

Benzene leads.—Of the 10 selected chemicals, benzene reveals the greatest percentage increase over the previous year due to gains from petroleum sources. A comparison of the preliminary 1950 figures with final totals for 1949 appear below:

	Prod. (1,000 gal.) 1949	1950
Motor grade:		
Tar distillers	2,437	5,739
Coke-oven operators	20,924	6,591
All other grades:		
From tar and petroleum	10,517	34,929
From coke ovens	122,741	153,801
Total motor grade	23,361	12,330
Total other grades	133,258	188,730
Grand total	156,619	201,030

These figures reveal an added effort on the part of all classes of producers to increase the volume of chemical benzene. Petroleum benzene, while accounting for a minor fraction of the total, showed the greatest percentage increase. In 1949 only small quantities of benzene were produced from petroleum, but during 1950 two major commercial plants were in operation, producing an estimated 10,000,000 to 12,000,000 gal. The effect of this added production is reflected in the increase in total benzene produced by tar distillers and petroleum companies. Actual figures on petroleum benzene produced in 1950 are not yet available.

Cresylic acid production rose to 31,077,152 lb. in 1950 according to the preliminary Tariff Commission figures, a 35 per cent increase over 1949. Again, the volume produced from petroleum is not reported, but of 11 companies listed as producers of this aromatic chemical, 6 are oil companies or affiliates.

Ethylene glycol.—Ethylene glycol shows an estimated 16 per cent increase with 510,522,444 lb. reported for 1950 as compared with 439,746,000 lb. produced in 1949. Since an estimated 85 per cent of this chemical, used primarily as antifreeze, derives from ethylene, most of the increase represents a rise in manufacture from natural gas and refinery gas.

Ethyl ethers, also partially derived from petroleum, increased in production from 33,017,000 to 37,332,438 lb. Formaldehyde and methanol, of which large quantities are now synthesized from olefins and produced by direct oxidation of natural gas, showed gains over 1949. Formaldehyde production increased 42.5 per cent from 549,744,000 lb. in 1949 to 783,939,988 lb. in 1950. Methanol, now about 90 per cent derived from petroleum and natural gas, show increased production of 61,147,000 lb. to total 899,950,000 lb. in 1950.

Styrene.—Reflecting the revived synthetic-rubber program, styrene production in 1950 rose to 540,703,000 lb. as compared with 390,446,000 lb. the previous year, up 38 per cent. Toluene production showed a decline in total production. Although coke-oven operators increased production slightly in 1950, the combined output of tar distillers and producers from petroleum

dropped from 54,080,000 gal. in 1949 to 34,329,290 gal. in 1950. Some of this decline may be attributed to the diversion to benzene manufacture. Xylenes, an estimated 85 per cent derived from petroleum, gained 8.7 per cent with 1950 production at 66,933,467 gal.

Ethyl alcohol.—Ethyl alcohol production, reported by the Bureau of Internal Revenue, amounted to a total of 1,300,000,000 lb. in 1950. Of this total, 57 per cent or 759,000,000 lb. was produced synthetically. About 70 per cent of synthetic ethanol comes from petroleum. Total synthetic ethanol production in 1949 was 653,189,000 lb. and 1950 production represents a 16 per cent increase in synthetic product.

The foregoing comparisons based on preliminary totals of a few selected chemicals serve only to indicate 1950 production of petrochemicals as compared with output of the previous year. Direct comparisons of basic petrochemicals will not be possible until further figures are compiled by the Tariff Commission.

MEETINGS

W.P.R.A. Program Set

SAN ANTONIO.—Final arrangements for the thirty-ninth annual meeting of the Western Petroleum Refiners Association, to be held here April 2-4, have been completed. Bruce K. Brown, deputy administrator of the Petroleum Administration for Defense, will head the list of speakers at the general session April 3. His address, "The Petroleum Administration and the Defense Program," is slanted to inform W.P.R.A. delegates on what lies ahead in the way of federal controls on the oil industry.

Dr. Alfred Haake, economist and consultant to General Motors Corp. also will speak April 3 on "Truth and Fair Play."

Leading off the session, R. W. McDowell, president of the association and president of Mid-Continent Petroleum Corp., Tulsa, will give a resume of association accomplishments during his terms as president.

Addressing delegates at the general session on April 4 will be Reid Brazell, director of the refining division of PAD, and Dr. Arthur A. Smith, vice president and economist of First National Bank in Dallas. Brazell will speak on "Contributions by the Small Refiner to the Defense Program," while Smith's address is entitled "Economic Stabilization on Wheels."

Technical papers to be presented during the 3-day meeting include:

"Knock-Free Engine Design—The Texaco Combustion Process," Blake Reynolds, Texaco Development Corp., New York City; "Why Diesel Fuels Behave As They Do," C. C. Ward and H. M. Smith, Petroleum Experiment Station, U. S. Bureau of Mines, Bartlesville, Okla.; "Recent Developments in Fire Protection for Petroleum Refining Operations," Sturgis L. Stentz, Stentz Equipment Co., Tulsa; A. F. Ratzer, Pyrene Co., London; and Harold J. Burke, C-O-Two Fire Equipment Co., Newark, N. J.

"A New Development in Radiant Heating for the Petroleum Industry," C. C. Tate, Phillips Petroleum Co., Bartlesville; "Petrochemicals in the Southwest," George Weber, The Oil and Gas Journal, New York City; "Sulfuric Acid Alkylation for Motor Fuel and Aviation Gasoline," J. W. Jewell and C. C. King, M. W. Kellogg Co., New York City.

CANADA

Oil to West Coast

Bechtel president clears status of proposed line

SOME of the mystery shrouding the construction of a crude-oil pipe line from Alberta to the West Coast was cleared up last week when S. D. Bechtel, president of Bechtel Corp., and chairman of the board of Canadian Bechtel, Ltd., released a statement concerning the present status of the line.

A bill providing for the incorporation of Trans-Mountain Oil Pipe Line Co., a Bechtel sponsored organization, is up before the Canadian Parliament. This company proposes to build a crude line between Edmonton and Vancouver, B. C., by an all-Canadian route, Bechtel said.

Plans incomplete.—As yet the necessary studies have not been completed, and discussions are being held with various producing companies, he said. No company has commited for a throughput agreement, and it is not proposed to ask any company to execute such an agreement until the bill for the incorporation of Trans-Mountain is enacted and other arrangements completed.

If necessary approvals and arrangements are satisfactorily completed, Bechtel said, construction of the line will begin in July and be scheduled for completion by the end of 1952. Present plans call for the line to follow a route 715 miles long. The line, as it is now designed, would have an initial throughput capacity of 75,000 bbl. per day. Ultimate throughput when additional pump stations are built would be in the neighborhood of 200,000 bbl. per day.

Competition.—Present status of plans laid by Westcoast Transmission Co. to build a line over a similar route was not known. Last week, officials of Westcoast announced that the Canadian-sponsored firm also had both the pipe and the finance to build the line, and would be ready to commence construction via an all-Canadian route by midyear, pending approval by the Board of Transport Commissioners.

An official in Ottawa said that little opposition to Trans-Mountain is expected, short of the Board of Transport Commissioners. The all-Canadian route, he said, practically assured passage, and he believed that only such a route would get the go-ahead in Ottawa.

Model IV Cracker Planned

EDMONTON.—A new Model IV fluid catalytic cracking unit, the first of its kind, will be installed at the Imperial Oil, Ltd., refinery here. To be constructed by Foster Wheeler, Ltd., it will be the central part of Imperial's refinery-expansion program.

The cracker will have a capacity of 10,000 bbl. per day. Other new construction includes a 10,000 bbl. per day vacuum unit for feed preparation and a gas-compression and gas-fractionation plant auxiliary to the cracking unit.

The Model IV type was developed by Standard Oil Development Co. New design features a change from the towering cracking units now in service. The unit is smaller, closer to the ground, and the highest points of the two main vessels are less than 100 ft. from ground level.

New Petrochemical Plant

British American Oil Co., Ltd., and Shawinigan Chemicals, Ltd., have announced that they will shortly form a jointly owned chemical company and will construct a petrochemical plant at Montreal East, Quebec. Details of operation of the new plant were not disclosed, but the process to be employed was said to be new in nature.

Next Week

The Journal's 1951 Annual Refining Number. This large, informative issue will be in three parts:

Processing details.—Here you will find 39 easy-to-read flow charts and descriptions of the principal newer petroleum-refining processes.

Reference articles.—Engineering and operating articles contributed by authorities in the industry on a wide variety of subjects.

Refresher course.—Here is an entirely new feature which we feel you will enjoy. It affords you a pleasant opportunity to check up on your technical knowledge.

World Production Up

January reveals continued upward trend despite decline in output in several leading foreign areas during month

Dahl M. Duff

WORLD crude-oil production continued its upward trend in January, despite a decline in output in several leading foreign areas during the month.

Production in the United States showed a sharp increase of more than 200,000 bbl. daily, a gain which was more than sufficient to offset a drop in total foreign output.

Estimated United States production of crude during January was 5,935,000 bbl. daily. This record high compares to a revised December United States total of 5,718,600 bbl. daily.

Iran drops.—Most of the decline in foreign production occurred in Iran and Saudi Arabia, which dropped back from the record highs reported in December. As a result, total production in the Middle East was down nearly 6 per cent to 1,874,200 bbl. daily.

Foreign production in the Western Hemisphere declined slightly during January. Venezuela showed a relatively small increase, but production in Mexico was considerably below the record high level reached in the final month of 1950.

World total.—The net result of these changes gave a world total of 11,294,300 bbl. daily. This represented an increase of nearly 1 per cent over the previous month's total of 11,190,700 bbl. daily. The January total was slightly above the previous high of 11,274,000 bbl. daily which was produced during November.

Venezuela.—In Venezuela, during the week ended January 29, production hit an all-time record, on a weekly basis, of 1,654,200 bbl. daily. Output in Venezuela during the other weeks of January was: week ended January 8, 1,613,898 bbl. daily; week ended January 15, 1,618,792 bbl. daily; and week ended January 22, 1,646,000 bbl. daily. Daily average production of the individual operators in Venezuela during January follows (Venezuelan Government figures):

Creole	751,659
Shell	504,804
Mene Grande	224,240
Socony-Vac.	46,780
Texas	25,627
Mercedes	21,588
Atlantic	19,933
Sinclair	11,263
Pantepec	10,793
Richmond	10,447
Phillips	6,347
B.C.O.	914
Guasare	15
Total	1,634,410

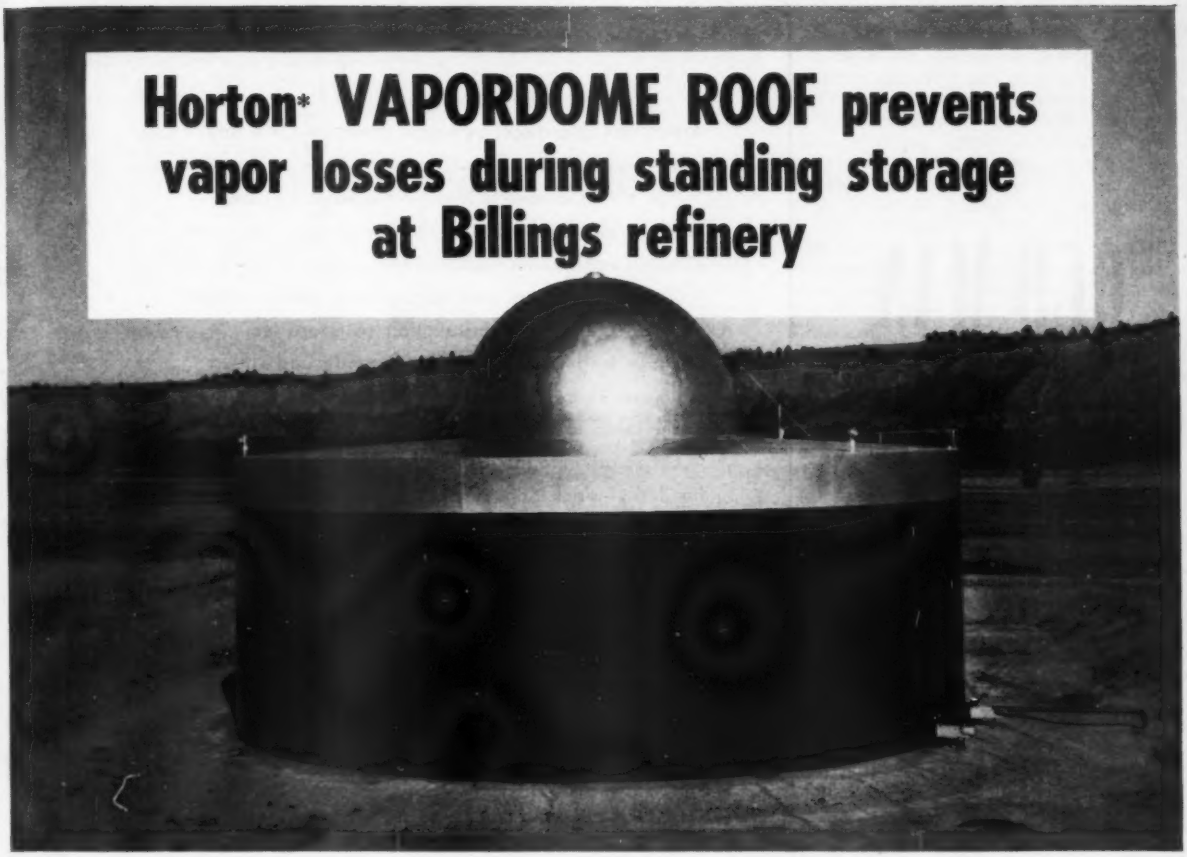
Colombia.— Production in Colombia during January was down slightly because of damage to a pipe line, forcing curtailment of shipments. Output of individual concessions was: De Mares, 38,625 bbl. daily; Barco,

WORLD CRUDE-OIL PRODUCTION
(Thousands of barrels daily)

Country—	Jan. 1951	Dec. 1950	Jan. 1950
Western Hemisphere:			
Argentina	65.0	65.0	60.4
Bolivia	2.0	1.7	2.2
Brazil	1.2	0.6	0.6
Canada	91.0	82.8	61.0
Chile	1.7	1.7	2.0
Colombia	101.3	103.0	81.3
Cuba	0.3	0.3	0.6
Ecuador	7.5	7.5	7.0
Peru	43.0	43.1	41.0
Mexico	207.0	228.0	183.4
Trinidad	57.5	57.5	55.7
Venezuela	1,634.4	1,622.4	1,464.9
Total	2,211.9	2,213.6	1,960.1
Europe and Africa:			
France	4.0	3.7	1.2
French Morocco	0.9	0.9	0.6
Germany	23.1	23.4	18.5
Italy	0.2	0.1	0.2
Netherlands	12.3	12.6	11.1
Egypt	43.7	45.0	45.5
United Kingdom	0.9	0.9	1.0
Total	85.1	86.6	78.1
Middle East:			
Bahrein	30.1	29.9	30.6
Iran	647.8	726.7	598.7
Iraq	168.6	166.8	115.5
Kuwait	422.0	403.7	275.0
Qatar	44.1	43.5	20.3
Saudi Arabia	561.2	617.9	449.9
Turkey	0.4	0.4	0.6
Total	1,874.2	1,988.9	1,490.6
Other Asia:			
British Borneo	100.0	95.0	76.4
Burma	2.0	2.0	2.0
China	2.2	2.2	1.5
India	5.2	5.2	5.3
Indonesia	155.0	155.0	103.0
Japan	5.8	6.0	5.0
New Guinea	4.8	4.8	4.8
Pakistan	4.0	3.7	2.5
Total	279.0	273.9	200.5
Total, foreign less Russia and E. Europe	4,450.2	4,563.0	3,729.3
Estimated Russia and Eastern Europe:			
Austria	25.0	25.0	20.0
Romania	85.0	85.0	82.0
Russia	775.0	775.0	730.0
Other E. Europe	24.1	24.1	19.0
Total	909.1	909.1	851.0
Total, foreign	5,359.3	5,472.1	4,580.3
United States	5,935.0	5,718.6	4,922.2
World total	11,294.3	11,190.7	9,502.5

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these areas. Completely current reports are also lacking for certain areas of Southeast Asia.

Horton* VAPORDOME ROOF prevents vapor losses during standing storage at Billings refinery



The 120,000-bbl. tank shown above stores the composite gasoline production from three units in Continental Oil Company's refinery at Billings, Mont. The liquid in the tank is then used as the base gasoline stock in blending.

Frequently, gasoline stands in the tank for several months. Any loss of light fractions during this storage would reduce the value of the gasoline and be quite costly to the company.

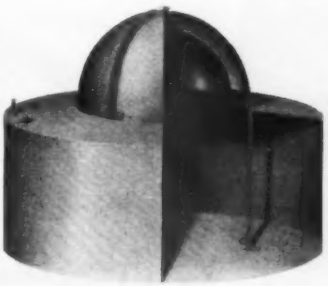
To prevent such losses, Continental chose a tank equipped with a Horton Vapordome Roof. There's a flexible membrane inside the dome. This membrane prevents excessive losses because it provides capacity for the temporary storage of gasoline vapor. Its operation is described in detail below.

How effective is the Vapordome? Continental says "The tank has worked very satisfactorily since it was placed in operation . . ."

HOW THE VAPORDOME ROOF WORKS—The drawing at the right shows the flexible, hemispherical membrane inside the Vapordome. When the atmospheric temperature rises, expanding vapors lift the membrane into the dome, expelling air above the membrane through the dome vent. When the vapors contract, the membrane rides back down and air enters the dome above the membrane.

No vapor is lost during standing storage unless the capacity of the Vapordome is exceeded.

When the tank is filled, the Vapordome provides capacity for part of the vapor displaced by liquid.



VAPORDOME ROOF CAN ALSO SERVE A VAPOR SAVING SYSTEM—A Vapordome Roof may serve a single tank, as illustrated, or a tank with a Vapordome Roof may be connected to several cone-roof tanks. When this is done, the Vapordome must have sufficient capacity to handle expanding vapors from both the interconnected tanks and the tank on which it is installed.

Bulletin D gives more complete details about the Horton* Vapordome Roof and vapor-saving systems. Write our nearest office for a copy.

**Trademark registered in U. S. Patent Office.*

CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Comprimo N.V., Amsterdam—O, Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
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Sociedade Chibridge de Construcoes Ltda., Rio de Janeiro, Brazil

"OLD MAN RIVER"

helps cut line pipe costs

Armco can ship direct by barge down the Ohio and Mississippi to help cut transportation costs on line pipe.

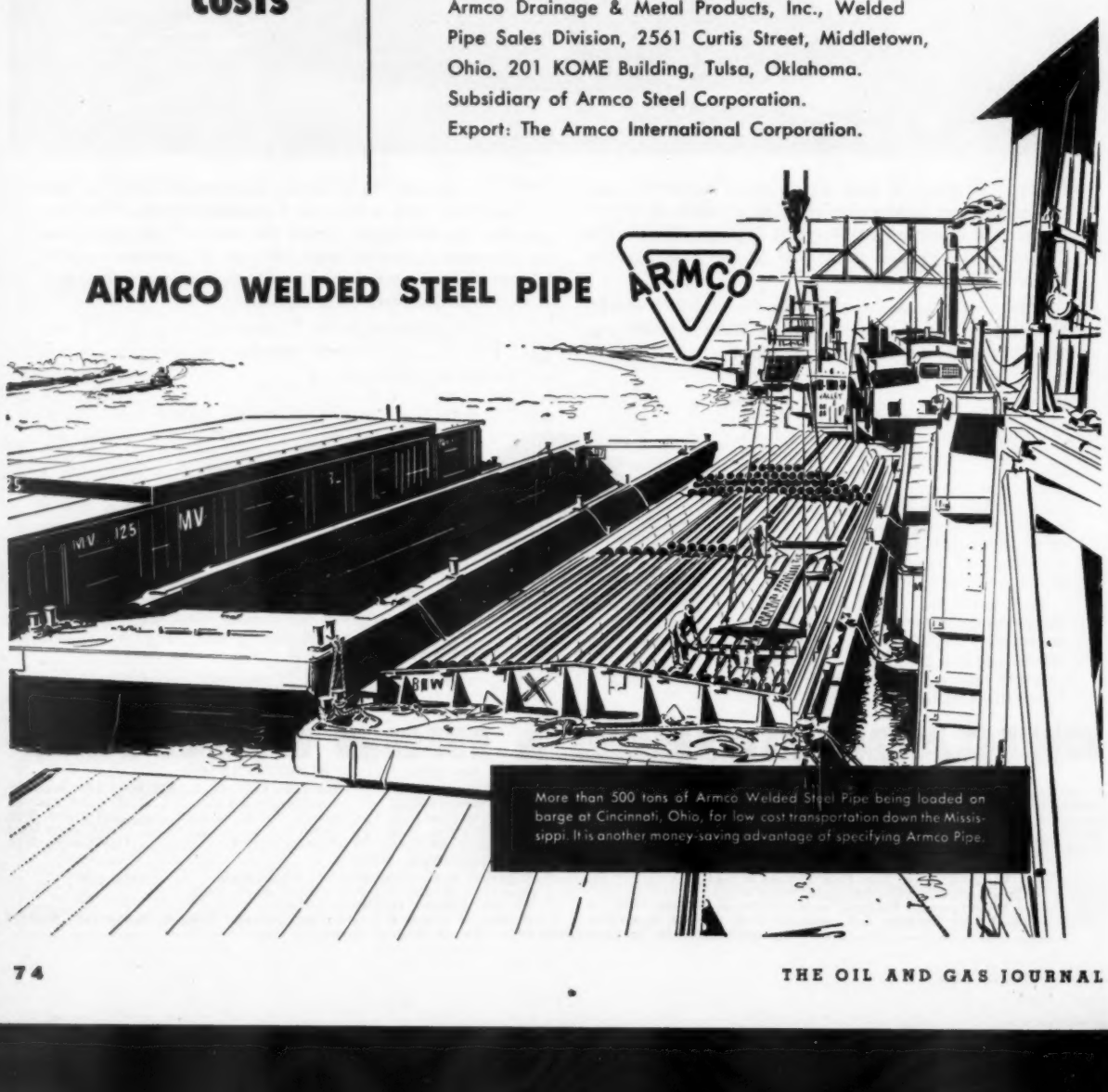
You can also save in many other ways by using Armco Welded Steel Pipe. The wide range of diameters (6 to 36 inches) with wall thicknesses from 9/64- to 1/2-inch means you can match exact needs without buying excess metal. Installation costs are less because lengths up to 50 feet simplify and speed the work. There are fewer sections to handle, fewer joints to assemble.

Other advantages of Armco Steel Pipe include flexibility—slack loops and cold bends are no problem—and a high safety factor against internal and external pressures.

Use Armco Pipe with confidence for oil and gas lines, gathering systems and wherever else you need dependable piping. Write for complete information. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 2561 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO WELDED STEEL PIPE

ARMCO



More than 500 tons of Armco Welded Steel Pipe being loaded on barge at Cincinnati, Ohio, for low cost transportation down the Mississippi. It is another money-saving advantage of specifying Armco Pipe.

TREND OVER LAST YEAR

1950—	Western Hemisphere less U.S.	Middle East	Total foreign less Russia and E. Europe
February	1,820.6	1,366.6	3,689.4
March	1,900.4	1,607.4	3,812.9
April	1,968.2	1,639.5	3,918.2
May	1,775.4	1,752.0	3,847.4
June	2,098.2	1,811.5	4,229.6
July	2,073.2	1,808.3	4,202.6
August	2,097.8	1,839.5	4,273.6
September	2,146.1	1,803.7	4,297.1
October	2,185.7	1,893.2	4,428.9
November	2,213.8	1,899.1	4,474.1
December	2,213.6	1,988.9	4,563.0
January	2,211.9	1,874.2	4,450.2

26,811 bbl. daily; Yondo, 32,368 bbl. daily; Cantagallo, 7 bbl. daily; Dificil, 2,334 bbl. daily; and Velasquez, 1,182 bbl. daily.

Canada.—Production in Canada rose more than 8,000 bbl. daily over December, but was still considerably below the record of nearly 105,000 bbl. daily during November. Storage for Alberta's production is full, and output is expected to remain low until probably May when shipping opens on the Great Lakes. This summer, Canadian production may rise to as much as 150,000 bbl. daily.

Germany. — Production in Germany during January was little changed at about 23,100 bbl. daily. Of the 101,416 metric-ton total, 45,693 tons came from Emsland, 45,071 tons elsewhere in lower Saxony, 10,117 tons from Schleswig-Holstein and Hamburg, and 535 tons from Baden.

Middle East.—Iranian production during January averaged 647,800 bbl. daily, down nearly 80,000 bbl. daily from December, and in Saudi Arabia, output was 561,200 bbl. daily, off nearly 57,000 bbl. daily. Kuwait, on the other hand, showed another substantial increase, rising from 403,700 bbl. daily in December to 422,000 bbl. daily in January. The January daily average was another record for this country. Production in Iraq, nearly all of which comes from Kirkuk field, gained slightly to a record high of 168,600 bbl. daily. Eastern Mediterranean shipments of Saudi Arabian crude during January totaled approximately 7,200,000 bbl., or about 232,000 bbl. daily. These shipments are made from deliveries through the newly opened Trans-Arabian pipe line.

Far East.—In the Far East, production in British Borneo was estimated at 10,000 bbl. daily during January on the basis of the recent announcement of the Royal Dutch-Shell organization in London. Crude output of this area has risen sharply since the end of the war

China's small oil production, which fell into the hands of the Communists 2 years ago, has been estimated at between 1,500 and 2,000 bbl. daily. Following the Russian practice of reporting percentages only, the Peking radio said recently that crude production in China during 1950 was 35 per cent greater than 1949, new fields were repaired, and damaged wells repaired. The only Chinese production of importance has come from Laochunmiao field in Yumen.

Record Production

All-time records set in 1950, Chase survey shows

WORLD crude-oil production during 1950 reached an estimated 10,400,000 bbl. daily, an all-time high, Frederick G. Coqueron, of the petroleum department of Chase National Bank, New York City, states in his survey, "World Petroleum Operations, 1950."

Coqueron's figure compares with The Oil and Gas Journal estimate of 10,396,800 bbl. *(Annual Number, January 25, 1951, page 210).*

The Chase report estimated that crude oil produced in the United States during the year amounted to 5,405,000 bbl. daily, more than 52 per cent of the world total. The Middle East produced 1,802,000 bbl. daily, or 17.4 per cent; and Venezuela produced 1,498,000 bbl. daily, 14.4 per cent. Russia and satellite countries were estimated to account for 850,000 bbl. daily, or 8.2 per cent; while other countries produced 815,000 bbl. daily, or 7.9 per cent.

Middle East. — The Middle East increased its production during 1950 by nearly 25 per cent over 1949, Coqueron reported. Gains of 58.1 per cent for Iraq and 40.2 per cent for Kuwait were the largest contributing factors to the increase in this area, where American oil companies control approximately 44 per cent of the production.

Refining of crude oil throughout the world closely paralleled production during 1950. Coqueron estimated approximately 10,200,000 bbl. per day were processed. The United States refined 56.5 per cent of the total; the Caribbean area 12.1 per cent; and the Middle East, 8.5 per cent.

Western Europe.—Due to expanded refinery operations in Marshall-plan countries, western Europe increased its runs of crude oil by 48.5 per cent, the survey showed. Most significant gains were made by the three countries handling nearly 75 per cent of Europe's processing: The Netherlands, with an increase of 98.1 per cent over 1949; the United Kingdom, with a 52.9 per cent increase; and France, which increased throughput 25.5 per cent.

Reserves. — Proven and indicated crude-oil reserves of the world aggregated 86,000,000,000 bbl. at the end of the year, the survey disclosed. Important reserves are located in: The United States, with 27,000,000,000 bbl.; Kuwait, 11,000,000,000 bbl.; Saudi Arabia, 10,000,000,000 bbl.; Iran, 9,500,000,000; Venezuela, 9,000,000,000; Iraq, 7,000,000,000 bbl.; and Russia, 5,500,000,000 bbl.

MIDDLE EAST

Oil Nationalization

Whether Iran will take over properties of Anglo-Iranian as voted by Parliament remains a matter of speculation

Dahl M. Duff

ONE of the most important foreign oil concessions was thrown in jeopardy late last week when the lower house of the Iranian Parliament unanimously voted to nationalize properties of Anglo-Iranian Oil Co., Ltd.

The vote followed weeks of mounting agitation and feeling against the British-owned company. All 106 deputies attending the session of the Majlis, or lower house, voted for nationalization. News reports said more than 2,000 persons outside the building cheered the action and carried deputies on their shoulders.

Whether the Iranian Government will carry through to actual seizure of the company was a matter of speculation. The question was largely on a government level since the British Foreign Office earlier in the week had delivered a note to Iran warning that the British Government would take "all possible steps" to protect such a major British enterprise.

Other O.K.'s needed.—The vote by the lower house of the Iranian Parliament is subject to approval of the senate and Shah Mohammed Reza Pahlevi. If the senate disapproved, it can be revoted and validated despite the senate action. The Shah could block the measure by dissolving the parliament.

Passage of the nationalization measure this week by the senate was considered certain. A 24-man Senate committee unanimously recommended approval which would complete legislative enactment of the proposal. In Teheran, a leading but unidentified political figure supporting nationalization was reported as saying that Iran would continue to supply Britain with oil and that the nationalization was necessary to avert new Rus-

sian pressure for similar oil concessions in the country. He said Iran would still be ahead even if production fell by 75 per cent since the country would still receive more money than it now does in royalty payments.

The nationalization proposal voted by the Majlis carried two amendments. One provided a 2 months' study by the oil committee of ways to implement the law. The other called for the employment of foreign technicians to assist with the study.

Settlement efforts. — During this 2 months' period, it is expected that renewed efforts would be made to effect a settlement of the long-pending royalty-rate question which lies in the background of the nationalization action. Anglo-Iranian 2 years ago agreed with the Iranian Government to a revision of its concession under which royalty would be boosted by 50 per cent to the equivalent of about 33 cents a barrel and other concessions, equal to 8 or 9 cents a barrel, made. The Majlis oil committee recommended against ratification of this agreement, and then, after the March 7 assassination of Premier Ali Razmara, submitted the nationalization proposal to the Parliament.

Offer made.—The note delivered by the British Government to Iran brought the disclosure that Anglo-Iranian already had made an offer to the Iranian Government for an equal sharing of its profits in Iran. British ministers discussing the matter in Parliament in London said this offer was made before the Razmara assassination. A profit-sharing arrangement was reached late last year by Arabian American Oil Co. and the Saudi Arabian Government.

American oil men were surprised at the suddeness of the Iranian nationalization action. Originally the proposal had not been scheduled for debate until the latter part of the week. In New York, the action was deplored as an illegal repudiation of a valid concession, and from the standpoint of the Iranians, completely unrealistic since they have neither the technical personnel nor the financial resources to operate the industry.

Red influence.—Just how much Russian inflence lay back of the action of the Majlis was problematical. All the proSoviet factions in the chamber supported the measure, which is in line with their normal policy. Politically the modern history of Iran is one of balancing Russian and Western influences. After the war and Russia's unsuccessful attempt to remain in northern Iran, the Iranian Government ruled no more foreign oil concessions would be granted and made it illegal for officials even to discuss the matter.

It was believed the Iranians probably would approach oil men in the United States for the technical assistance authorized in connection with the nationalization study. This country would be the principal source of such assistance with the possible exception of Russia which the Iranians probably wish to hold at arm's length.

View of Anglo-Iranian Oil Co., Ltd.'s Agha Jari-Abadan pipe line.

Resistance expected. — The British Government, which holds 52.55 per cent of Anglo-Iranian's stock, undoubtedly will resist the nationalization attempt by all possible diplomatic and economic means. In this it probably will have the cooperation of the United States Government which is committed to upholding valid concessions and to the principle of full compensation if they are taken over. If the nationalization plan is actually carried through, the company is expected to take its case to the International Court at The Hague.

In addition to the diplomatic and legal difficulties, the Iranians would face other almost insuperable obstacles in operating the properties. The Iranian Government, which has verged on bankruptcy and is heavily in debt to the company on advance royalties lacks money to pay for the properties. The Iranians would have difficulty financing even current operations of the company.

No technicians. — Although Anglo-Iranian has operated schools and training programs in Iran, it is said that there is not one Iranian in the higher technical management of the company. Furthermore, Iran lacks the world-wide tanker fleet, sales outlets, and other facilities needed to dispose of oil production.

The developments in Iran were being closely followed by oil men in the United States. While the political situation in Iran is the most volatile of any in the Middle East, there was concern over the long-range effect on other countries with foreign oil concessions. The royalty question has not been fully settled in Iraq, and the government there is pressing for greater oil revenue.

Stock drops. — Anglo-Iranian's stock dropped in New York and in London on news of the nationalization vote. However, the decline was not great, indicating investment interests, initially at least, did not believe that the company's future had been seriously threatened.

Large producer.—Anglo-Iranian, on the basis of 1950 production, runs neck-and-neck with Creole Petroleum Corp. as the world's leading oil-producing company. At Abadan, at the head of the Persian Gulf in Iran, it operates the world's largest refinery—capacity 500,000 bbl. daily. In the absence of official information, the company's reserves have been estimated at from 7 to 13 billion barrels, the latter figure being that given recently to the O'Mahoney committee in Washington by the Interior Department's Oil and Gas Division. Not including its crude reserves, replacement value of its properties in Iran have been unofficially estimated at around $1,050,000,000 with even net depreciated value coming to about $165,000,000. In addition to its field and two refineries in Iran, the company and its affiliates operate 10 other refineries in Europe, the Mediterranean area, and Australia.

Loss of Iran's production would be of the utmost seriousness not only to the oil industry but also to the entire non-Communist world. Anglo-Iranian's output, which in January was nearly 650,000 bbl. daily, could not be made up except through great effort over 2 or 3 years in such countries as Kuwait—where Anglo-Iranian has a half interest—Iraq, Saudi Arabia, Qatar, and Venezuela.

U. S. view. — In Washington, Secretary of State Dean Acheson expressed the hope that Britain and Iran would be able to iron out their differences so that there would be no chance of Russia getting Iran's oil.

Department officials who have been watching the situation, however, expressed doubt that Russia would want Iran petroleum because they felt the Communists would have no use for it. Russian refinery operations are believed to be in balance with enough products being produced to meet the country's needs.

Accordingly, if Russia were to buy Iran oil additional storage probably would have to be provided in volume not believed to be contemplated in the 5-year plan under which all Russian industrial operations are programed.

Could be serious.—It was emphasized, however, that if the situation developed to a point where there was any

interruption in the movement of oil from Iran it would be a serious problem for the democratic countries. Formerly, most of the oil went to western Europe but under an agreement with Anglo-Arabian Co., Standard Oil Co. (N. J.), and Socony-Vacuum Oil Co., Inc., now are permitted to buy 40 per cent of Iran's oil.

It is understood that in recent months, since the new profit-sharing arrangement of Arabian American Oil Co., suggestions have been made to Britain that it might be advisable for British companies to consider more generous terms for the governments of countries in which they have oil concessions, with a view of strengthening relations with those countries.

Projects Abandoned

Syrian, Australian work ends with no production

DECISIONS to abandon exploration programs which have been carried out in two widely separated areas—Syria and Australia—were disclosed last week.

Syria Petroleum Co., Ltd., associated with Iraq Petroleum Co., Ltd., has told the Syrian Government it will discontinue all activities and close its offices in the country within 6 months. The company is retaining out of its concession only a small area in Upper Djezira, near the Iraq frontier, until 1954.

No production found.—Syria Petroleum has failed to find commercial production in the country after a prolonged exploratory effort costing the equivalent of about $17,000,000. A 10-year concession was granted in 1938 and was extended until 1954 to cover the 6 years' suspension of activities during the war.

Three years ago, the company relinquished its area in southern Syria, the first of the three zones in which it held rights. The original concession called for 5 years of work in each of the three zones. A year ago, reports in the industry were that the program was nearing conclusion without successful results to justify its continuance. In all, Syria Petroleum has drilled 11 wells and a total of 26,000 m. (about 85,000 ft.).

Aussie effort ends.—In Australia, a joint statement by the Queensland mines minister and E. N. Avery, managing director of Shell (Queensland) Development Pty., Ltd., said that the company was abandoning its exploration for oil in Queensland.

The statement, issued in Brisbane, said the company found it impossible to continue its efforts which have cost more than one million Australian pounds, as there were no further worthwhile possibilities offering any reasonable chance of commercial success within the company's area of interest.

The Royal Dutch-Shell subsidiary was the only major international company still carrying on exploration in the Australian continent itself. Last May the company commenced a deep test at Morella, 100 miles south of the Springsure railhead, in Queensland. This well culminated geophysical and geological work which the company had carried out in central and western Queensland beginning in 1940 and resumed in 1946 after the war.

Survey work.—Some surveying work is being continued in Australia by local companies and the commonwealth and state governments. It was recently announced that geophysicists of the Australian Bureau of Mineral Resources are beginning an aerial-magnetometer survey of the Lakes Entrance district of Victoria and that further surveys of this type will be made elsewhere in Australia.

LATIN AMERICA

Contract Signed

Kellogg to build new Rio plant for Brazilian firm

A CONTRACT for the construction of a new 10,000-bbl. daily refinery in Rio de Janeiro, Brazil, was signed last week by a private Brazilian company with M. W. Kellogg Co.

The company is Refinaria de Petroleos do Distrito Federal, S.A., which has for several years held a concession from Brazil's Conselho Nacional do Petroleo for the construction of a refinery in the republic's capital.

The plant will include thermal cracking facilities and will operate on imported crude oil. The Kellogg organization will begin engineering work immediately, and expects to have personnel in the field in the next 4 or 5 months.

Officers.—Refinaria de Petroleos do Distrito Federal is headed by Dr. A. J. Peixoto de Castro, Jr., Brazilian industrialist, and Dr. Drault Ernanny de Mello e Silva, banker. Materials for the new refinery are to be purchased in the United States.

The Rio refinery will be the third major processing unit for the country. The government's conselho last fall opened its Mataripe refinery which is located near Bahia and operates on domestic crude. Site-preparation work also is under way for the construction by the conselho of a 45,000-bbl. daily refinery at Cubatao, near Santos. Material for this refinery is being obtained largely in Europe, and reports indicate its completion is several years away.

Expansion planned.—Kellogg also has signed a contract with the conselho for doubling capacity of the newly opened Mataripe refinery. Another combination thermal cracking-topping unit will be added, along with a catalytic polymerization unit, L.P.G. equipment, and additional outside facilities. Engineering work is now under way, and personnel is expected to be in the field in about 3 months.

The original 2,500-bbl. daily plant, built by Kellogg, was opened in September after test runs. It operates on Candeais and Dom Joao crude from nearby fields of the conselho.

Bolivia Seeks U. S. Aid

Guillermo Mariaca, general manager of Yacimientos Petroliferos Fiscales Bolivanos, Bolivian Government oil organization, arrived recently in the United States to investigate the possibility of obtaining assistance in producing operations in that country.

The Y.P.F.B. official, now in Washington and expected to be in the United States several weeks, is reported to be seeking a United States company to cooperate with Y.P.F.B. in developing the recently discovered Los Monos structure. The agency also is seeking a loan of between $1,500,000 and $2,000,000 for the purchase of rigs and other drilling equipment for use at Camiri.

Greater production is the prime objective in Bolivia at present. Two recently completed refineries have a capacity of about 7,000 bbl. daily but production has been running considerably below this. The principal refinery was constructed through an Export-Import Bank loan.

EUROPE

New Discovery Reported

An outstanding new oil discovery for Western Germany has been indicated in the wildcat 1 Hohne of the German company, Deutsche Erdoel, A.G.

The discovery is located 12 miles east of Celle, about 1.2 miles north of the village of Hohne, and 6 miles south of Eldingen field. Production tests gave an inital flow of approximately 350 bbl. daily from a depth of 5,761-5,784 ft. The producing formation, a Lias alpha sandstone (Lower Jurassic) has not yet been completely penetrated.

Shell Training Courses

The Shell organization has inaugurated executive training courses in Britain for senior staff members from various countries in its world-wide organization. The first group, drawn largely but not exclusively from the marketing branch, opened the company's new training center at Teddington near London. Each course lasts 10 weeks and is restricted to 12-14 participants.

"Only by direct analysis of cored samples can all productive characteristics of sub-surface formations be accurately determined."

CORE LABORATORIES, INC.

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER, WICHITA FALLS, and POST, TEX.; OKLAHOMA CITY and ARDMORE, OKLA.; SHREVEPORT and LAFAYETTE, LA.; NATCHEZ, MISS.; BAKERSFIELD, CALIF.; DENVER, COLO.; WORLAND, WYO.; EL DORADO, ARK.; FARMINGTON, N. MEX.; CALGARY and EDMONTON, CAN.; VENEZUELA, S. A.

PERSONALS

A.A.P.G. Head

Frank Morgan is veteran with Richfield Oil Corp.

FRANK A. MORGAN, newly elected president of the American Association of Petroleum Geologists, and vice president of Richfield Oil Corp., Los Angeles, has figured prominently in the discovery of some of California's major oil fields.

About 22 years ago he had an active part in the discovery of Elwood field in Santa Barbara County, California. Since then, as Richfield's manager of exploration, he has been closely identified with the discoveries of North Coles Levee in 1938, the famed Russell Ranch field in 1948, and the larger South Cuyama field in 1949.

A native Californian, Morgan was born at Sonora in the Mother Lode mining region of Tuolumne County. He attended University of California at Berkeley, where he received a degree in geology in 1920. For the next 9 years he was a consulting geologist and valuation engineer, most of the time living in Los Angeles.

In 1929 Morgan became chief geologist and vice president of Rio Grande Oil Co. and Reservoir Hill Gasoline Co. He continued in this capacity until 1937, when a merger of Rio Grande and the old Richfield Oil Co. brought him to an active part in the Richfield organization.

Clyde Herring, production foreman for Shell Oil Co. at Morgan City, La., has been transferred to the Gibson district at Houma, La.

R. E. Dobkins, foreman in the Phillipstown, Ill., district for Sun Oil Co., has been transferred to Morganfield, Ky., as assistant superintendent of production for the district.

William Hommel, formerly with Exploration Service Co. as seismic computer at Sterling, Colo., has joined Gulf Oil Corp. at Durango, Colo., as surface geologist.

Jack L. Coulson, division production superintendent for Warren Oil Corp. at Wichita Falls, Tex., has been transferred to Abilene, Tex., where the division office is now located. **Richard W. Scott,** division geologist, has also been transferred from Wichita Falls to Abilene.

Bryant E. Harrell has joined the market-development division of Jefferson Chemical Co., Inc., New York.

Paul E. Fitzgerald, geologist for Dowell Incorporated, has been elected to the board of directors of the American Institute of Mining and Metallurgical Engineers. His nomination was made at the recent annual meeting in St. Louis. Fitzgerald has been a member of the organization for many years, serving in the petroleum division. He has been with Dowell since 1933 serving both in domestic and foreign activities. He is a member of the American Petroleum Institute, Sigma XI, and several other organizations.

***HONORARY MEMBERSHIP.** — R. R. Rieke, left, president of the Houston Geological Society, presents an honorary membership to Paul Weaver, chief geophysicist, Gulf Oil Corp., in recognition of his service.*

R. F. Scheig, independent oil operator, has moved his offices from San Antonio to Austin, Tex.

Roy F. Beery, Jr., formerly division superintendent for Southern Production Co. at Norman, Okla., has joined J. S. Abercrombie Co. at Houston as petroleum engineer.

V. R. Oakley, vice president in charge of manufacturing for Bareco Oil Co., and **R. E. Stewart,** general sales manager of refined products sales, will move their headquarters from Wichita, Kans., to the general office in Tulsa.

Ralph J. Coleman, assistant general manager, and **Steward Barkley,** chief geologist, have resigned their positions with Mexican Independent Oil Co., and are planning to return to the United States from Mexico in mid-March.

G. L. Whipple, division superintendent for Standard Oil Co. of Texas at Amarillo, has been transferred to Houston as chief geologist.

DON R. FORD

Don R. Ford, assistant manager of pipe lines for Magnolia Pipe Line Co., has been elected to the board of directors. Ford, who joined the firm in 1927 after graduation from Marietta College in Ohio, has been a pipeliner, district gager, chief gager, division superintendent of the southern division, and in 1949 was named to his present position at Dallas. **Clarence S. Cone, Jr.,** chief accountant, has been elected assistant secretary of the firm.

Tracy J. Kennedy, petroleum engineer for Magnolia Petroleum Co., has been transferred from Oklahoma City to Electra, Tex.

I. G. Davis, division manager in Maracaibo, Venezuela, has been elected vice president and director of Mene Grande Oil Co., C. A., replacing **Robert L. Boggs** who has been transferred to the office of the foreign production division in New York. Davis joined Gulf Research & Development Co. in Venezuela in 1935 as geophysicist, and in 1939 joined the geological department of Mene Grande in Maracaibo. In 1940 he was transferred to Caracas, returning 6 years later to Maracaibo as assistant to the division manager. He was named division manager in 1948. **George L. Lockett,** formerly chief

XUM

PERSONALS

geologist, will succeed Davis as division manager in Maracaibo. Lockett, who has served with Gulf Companies for 16 years, began his career in Venezuela as a subsurface geologist in Lagunillas. In 1946 he was named assistant chief geologist at Caracas, then chief geologist, and later appointed division manager in western Venezuela.

Barney C. McCasland, Jr., has been appointed district geologist for Cities Service Oil Co. at Olney, Ill. He has been with the firm and its affiliates since 1941, and for the past 4½ years has been on the geological staff at Jackson, Miss.

D. M. Morrison, manager of the Montreal East refinery of Shell Oil Co. of Canada, Ltd., has been granted a leave of absence to head the refining section of the newly formed petroleum division of the Canadian Department of Trade and Commerce. **Ralph F. Will,** of Calmont Oils, Ltd., Calgary, will head the producing section, **Harold E. Saunders,** of McColl-Frontenac Oil Co., Ltd., Montreal, will head the materials section, and the supply and transportation section will be headed by **G. S. Hanna** of British American Oil Co., Ltd., Toronto. Eastern representative for the producing section will be **Walker L. Taylor,** of Imperial Oil Co., Ltd.

Guy H. Woodward, formerly assistant to the late Sen. Ed Moore of Oklahoma and now connected with the Mid-Continent Oil and Gas Association, is leaving the association and on April 1 will join Noble Drilling Corp. in Tulsa.

Charles Gandaubert, superintendent of General Petroleum Corp.'s southern division, Los Angeles, has been elected chairman of the Los Angeles Basin chapter of the American Petroleum Institute. Other newly elected officers were: **Stafford Park,** Fullerton Oil Co., vice chairman; **William Anderson,** Oil Tool Corp., secretary-treasurer; and **Art Curran,** Schlumberger Oil Well Surveying Corp., assistant secretary-treasurer.

William M. Wilson, formerly assistant superintendent of the refining division for Lion Oil Co., has been named superintendent of the new natural-gas department of the oil-production division. Other changes include: **Oscar H. Rothe,** formerly chief engineer at the refinery, promoted to assistant refinery superintendent; **J. B. Adams,** formerly mechanical superintendent, named assistant chief engineer; **Max S. Moody,** formerly process foreman, named process superintendent; **A. L. Mostler,** shift foreman, named process foreman; and **Hayes Jolley,** stillman, named shift foreman.

Robert N. McMichael, chemical engineer for Hunt Oil Co., has been transferred from Harleton, Tex., to Homer, La.

Lewis V. Roos, seismologist for The Texas Co., has been transferred from Sterling, Colo., to Denver.

R. F. Hinchey, West Texas Gas Co. president, was named chairman of the board of directors. **C. I. Wall** will succeed Hinchey as president. Other new officers in the company include: **T. S. Whitis,** vice president, transmissions; **H. F. Heath,** vice president, distribution; **J. J. Wiley,** vice president, accounting and budget control; and **R. M. Curry,** assistant to the president.

Lee Cornell, formerly with Stanolind Oil & Gas Co. for 24 years, has joined Franco Central Oil Co., at Wichita, Kans.

John G. Tripp, head of development and engineering work for the U. S. Bureau of Mines at Rifle, Colo., has been transferred to Washington, D. C., as technical assistant to the chief in the synthetic-fuels division.

Leo L. Graham, general line foreman for Sinclair Pipe Line Co. at Kansas City, Mo., has been transferred to Carrollton, Mo., as district superintendent.

C. L. Bainter, district manager for National Supply Co., Denver, has been elected president of the Petroleum Club of Denver. Other officers include: **H. T. Rapp,** Bennett Oil Co., first vice president; **David I. Sheppard,** Lion Oil Co., second vice president, and **Oscar S. Wood,** Colorado Petroleum Industries, reelected secretary-treasurer.

Travis M. Kerr has been named secretary of Kerr-McGee Oil Industries, Inc., and **F. C. Love** named treasurer.

Bryan O. Bishop, recent petroleum-engineering graduate from University of Oklahoma, has joined the North Basin Pools Engineering Committee in Denver City, Tex., as field engineer.

T. C. Stauffer, Evansville, Ind., manager of Sun Oil Co.'s central production division, has been elected chairman of the Illinois Basin chapter of the American Petroleum Institute.

C. S. Yust, district petroleum engineer, Pickton district, for Humble Oil & Refining Co., has been transferred to Houston as senior petroleum engineer. **D. T. Colley,** of the Anahuac district, Gulf Coast division, and **Eddie D. Loggins,** of the Snyder district, West Texas division, both district electrical foremen, have exchanged positions.

Harry Ptasynksi, development geologist for Pure Oil Co., Tulsa, has been transferred to Wichita as subsurface exploration geologist.

***OUTSTANDING SERVICE.**—As an award of merit for outstanding service to the Petroleum Club of Denver, C. L. Bainter, newly elected president of the club, gives a "Petroleum Club's Man of the Year" plaque to Maury Goodin, Petroleum Information Service, for the year 1948, H. Leslie Parker, independent, for 1949, and G. F. McMillan, Gulf Oil Corp., for the year 1950.*

PERSONALS

R. H. Alagood, district manager of Sunray Oil Corp.'s office at Shreveport, La., has resigned his position and will enter the oil business as a consulting geologist and independent operator at Shreveport. He received his geological degree from University of Oklahoma in 1935, and joined Pure Oil Co. at Corpus Christi, Tex. In 1946 he joined Sunray as district geologist at San Antonio, and was transferred to Shreveport as district manager in 1947.

W. E. Reed, Stovall Drilling Co., Inc., has been transferred from Monroe, La., to Satanta, Kans., as Kansas superintendent.

James H. McGuirt, formerly division geologist with Tide Water Associated Oil Co., has joined Austral Oil Exploration Co. in Houston.

T. R. Corbett, formerly manager of the manufacturing department for Carter Oil Co., has accepted the position of managing director for Esso Standard Refinery, S.A. of Belgium. This company is starting the construction of a new refinery at Antwerp, and is an affiliate of Standard Oil Co. (N. J.). Corbett will assume his new duties on April 1.

Sam L. Jackson, assistant chief engineer of Service Pipe Line Co., has been appointed assistant manager of the products pipe line department of Standard Oil Co. (Ind.). **V. J. Sittel,** senior engineer, has been named to succeed Jackson as assistant chief engineer. Jackson joined the firm as an engineer's helper and advanced to division civil engineer in 1935. After moving to Tulsa he was named senior engineer in 1946, and has been assistant chief engineer since 1947. Sittel joined the firm in 1932 as a lineman, was placed in charge of the electrical engineering design section in 1945, and was made senior engineer in 1947.

Jack Culberson, engineer for the Texas Railroad Commission, has been transferred from Pampa, Tex., to Corpus Christi.

A. H. Talley, exploration geologist for Sun Oil Co. at Tyler, Tex., has been transferred to Shreveport, La., in the same capacity.

Frank C. Stagner, foreman assistant for United Gas Corp. in the Southwest Louisiana division, has been named crew foreman in the same division. **Hilton Martin,** dehydration-plant operator in the Jackson, Miss., district, has been transferred to the Dallas, Tex., district as oiler-engineer at the Carthage gasoline plant.

Mercer Martin, independent oil operator, has moved his offices from Jal, N. M., to Fort Worth.

N. H. Wheless, Jr., of Wheless Drilling Co. of Shreveport, La., has been elected chairman of the Ark-La-Tex chapter of the American Association of Oilwell Drilling Contractors.

M. G. Barner, station engineer for Shell Pipe Line Corp., has been transferred from Wood River, Ill., to Bland, Mo., in a similar capacity. Other changes include: **B. D. Fairchild,** station engineer, transferred from Courtableau, La., to Neches, Tex.; **J. H. Harmon,** station engineer, transferred from Fairland, Okla., to Cushing, Okla.; and **C. W. Hudgins,** tank-farm gager, from Opelousas, La., to Courtableau as station engineer.

Ray F. Duffey, Crockett Oil Co., has been elected president of the Southwest Missouri Oil Men's Dinner Club of Joplin. Others elected include: **Ben F. Payne,** Standard Oil Co. (Ind), vice president; and **C. R. Archer,** Cities Service Oil Co., secretary-treasurer.

Julian Garrett, formerly director of Northwestern Utilities, Ltd., and Canadian Western Natural Gas Co., Ltd., and an independent natural-gas consultant in Edmonton, Alta., since his retirement from those companies, has accepted an appointment from the government of Barbados, British West Indies, as public-utilities commissioner and director of petroleum and natural gas.

Larry Schomaker, vice president in charge of sales for Northern Natural Gas Co., Omaha, was elected president of Mid-West Gas Association, a regional unit of the American Gas Association. **Amon H. Abott,** gas engineer of Northern States Power Co., Minneapolis, was elected first vice president.

Milo Siegel, independent operator, has opened offices at Denver. He will continue to maintain a residence at Newcastle, Wyo., to supervise production in that area.

C. M. Vignoles, eastern-area manager for Shell Petroleum Co., London, has been appointed a director of Shell-Mex & B. P., Ltd. He will become managing director of the companies when **C. M. Merrick** retires in the near future. Vignoles joined the Royal Dutch-Shell Group in 1924 and in the earlier part of his career served in the Far East. In 1932 he was transferred to the fuel-oil general department in London.

Robert B. Lambert, independent operator, has moved his headquarters from Midland, Tex., to Independence, Kans.

Gail Nussbaum, who has been with Champlin Refining Co. for the last 30 years, has resigned to open offices as an independent at Enid, Okla.

DEATHS

Robert Livingston, 74, formerly an engineer with the Bayway, N. J., refinery of Esso Standard Oil Co., died March 15 at Pinewald, N. J.

Harry Lawrence Hargus, 55, paymaster for Carter Oil Co., died March 18 at Tulsa. He had been with Carter and affiliated companies at Shreveport, La., and Tulsa for more than 30 years.

Larry Green, drilling superintendent for Armer & Speer Drilling Co. at Hutchinson, Kans., died March 10 in an automobile accident near Hutchinson.

J. L. Robertson, 52, well-known independent Kansas oil man, died in Fall River, Kans., March 15.

Jack Runnels, who retired from Sun Oil Co. in 1949 at Nederland, Tex., died there recently. He had been with the firm since 1930.

F. C. Asher, Sun Oil Co. foreman at Snyder, Tex., died recently. He had been with the firm since 1929.

Herman S. Simmons, 53, sales manager of Herb J. Hawthorne, Inc., Houston, died in Shreveport on March 6.

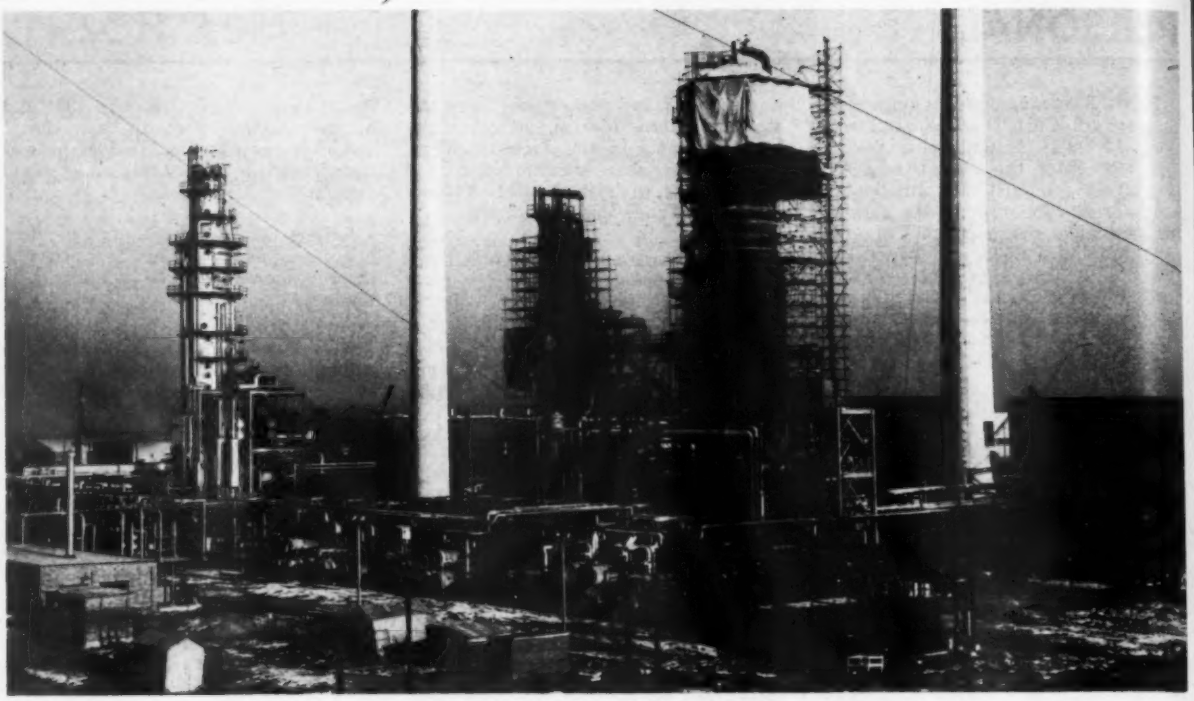
C. A. Fitzgerrell, 76, formerly with Sun Oil Co. and Gustafson Brothers Oil Co., died March 15 in Tulsa.

J. Russell Winch, 59, personnel and public-relations director of Lubrizol Corp., died March 14 in Cleveland.

Lloyd Nash, 57, land man in the Permian basin area for Tide Water Associated Oil Co., died March 17 at Midland, Tex.

H. H. Phillips, 54, veteran independent lease and royalty broker with headquarters at Chickasha, Okla., died March 16.

XUM

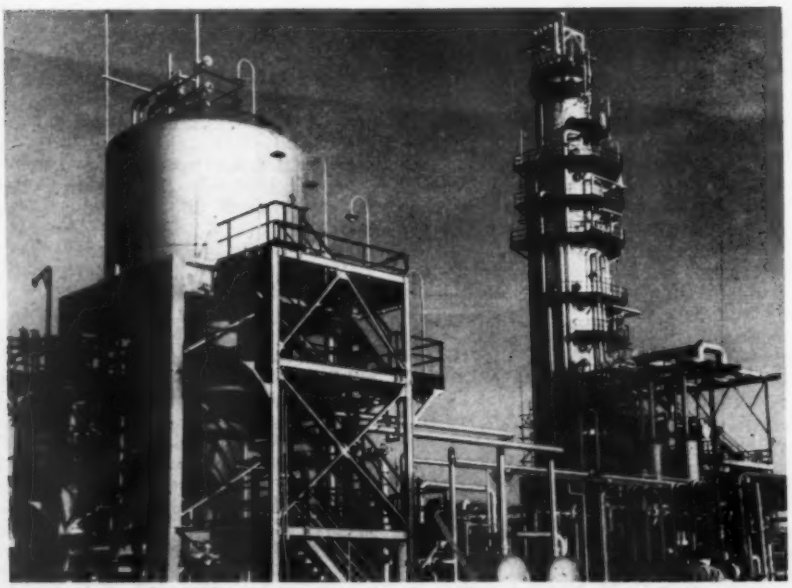


Single and two-stage crude units viewed from the roof of a storage tank.

Europe's Largest Refinery Scheduled for Initial Operation Within a Year

Giant new plant designed for processing 128,000 bbl. of crude per day being built by Anglo-American

by George Weber
Refining Editor



Copper sweetening unit with the single-stage crude unit in background.

EUROPE'S largest oil refinery is scheduled for initial operation at Fawley, South England, within a year. The giant new plant which will eventually be capable of processing 128,000 bbl. of crude oil per day is being built by Anglo-American Oil Co., Ltd., an affiliate of Standard Oil Co. (N. J.).

The original Fawley refinery consists of a small 21,000-bbl. per day installation. Its ultimate conversion into one of the world's major refineries will require about 3½ years of continuous construction. The first construction phase, now better than 50 per cent complete, involves the erection of nine principal processing units for producing petroleum fuels. Designed for a maximum yield of distillate fuels, they include two crude-distillation units with a combined daily charging capacity of 128,000 bbl., a fluid catalytic cracking unit, and the necessary auxiliary facilities for treating, power, maintenance, and operation.

The completed refinery will include a solvent lubricating-oil plant,

a catalytic polymerization unit and facilities for producing tractor fuel. Erection of these units will follow completion of the basic refinery units now under construction. When fully completed, Fawley will produce all of the major petroleum products. Most of the crude to be charged to the new refinery will come from the Middle East.

Present Construction

The principal contractor for the current basic construction work, erecting all of the process units is Foster Wheeler Corp. Except for tankage, marine facilities, and administration and laboratory buildings, this company is also installing all offsite facilities, including a complete steam plant.

New crude-oil distillation facilities comprise one single-stage atmospheric unit and a combination atmospheric and vacuum unit. The single-stage unit will produce the conventional straightrun distillate cuts including gasoline, naphtha, kerosine, gas oil, and diesel fuels, reducing crude charge to about a 25 per cent residual fraction.

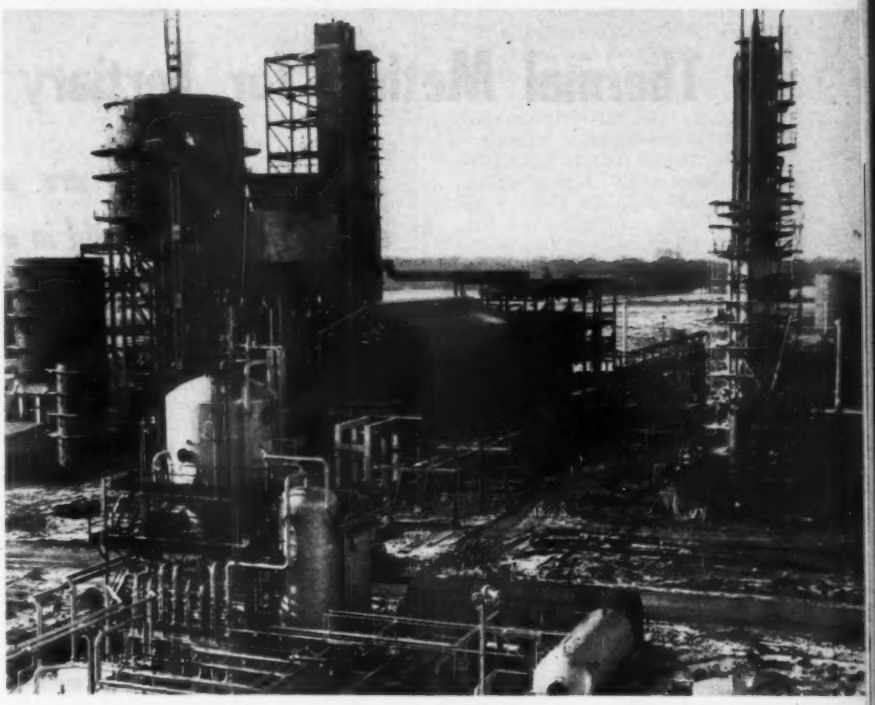
The two-stage unit will produce an additional gas-oil distillate fraction and will later provide distillate and residual stocks for lube manufacture, reducing crude to approximately a 20 per cent bottom fraction. Heavy naphthas from both units will be thermally reformed in an existing unit.

With exception of some straightrun gasoline, kerosine, tractor fuel, and diesel-oil fractions, the remaining distillate streams from both crude units will serve as feed for the fluid catalytic cracking unit. This new Fawley unit is similar to Esso's fluid cracker at Bayway, N. J., presently the largest of its kind in operation.

The regenerator on the new unit measures 54 ft. in diameter and 153 ft. in height, and the reactor has a maximum diameter of 35 ft. and a height of 130 ft. The unit will produce high-octane components for blending to two finished motor-fuel grades, plus diesel fuel, heating oil, and bunker-fuel blends.

Since most of the crude oils to be charged at Fawley will be of Middle East origin, treating will occupy an important processing position. Four new treating units are being added to the plant, and the existing doctor-sweetening facilities are being modified to conform to the overall operational program. New facilities include a hypochlorite unit for treating solvent naphthas and kerosine, an Edeleanu sulfur dioxide extraction unit for refining kerosine and high-speed diesel fuels, and two copper chloride units for finishing virgin and cracked naphtha and gasoline components.

Of the original crude-oil distillation capacity for 21,000 bbl. per day, about 10,000 bbl. will be continued in such operation. The remaining facilities, comprising shell stills, will be converted to rerun operation on such streams as solvent naphthas, SO_2 extract, etc.



View from the atmospheric tower single-stage crude unit showing the cat cracker area and debutanizer tower with copper sweetening unit in foreground.

Auxiliaries

For an expansion program of this major scope, new auxiliary facilities were required throughout the refinery. Process and power steam will be produced in a new plant incorporating six boiler units. The refinery will utilize purchased electric power from the nationalized service provided by the Southern Electricity Board.

A huge steel-and-concrete building measuring 800 by 180 ft. will house centralized shops for maintenance and repairs, storerooms, and changing and locker facilities for many of the estimated 2,000 employes who will operate the completed plant.

New refinery docks on Southampton Water are designed to accommodate the new 26,500-ton supertankers which will bring in crude. Marine designers have considered the spacing of berths to handle even larger vessels. An additional berth is being constructed to serve the small barges and coasters which will serve nearby areas with refinery products. These vessels plus deep-water tankers moving products to more distant points in the United Kingdom will handle about 90 per cent of the refinery's output.

By the end of past year most of

(Continued on page 96)

View from top of cat cracker showing the single-stage crude unit, copper sweetening unit with maintenance building in background.

A Thermal Method for Tertiary Recovery of Oil

Laboratory results are promising, but the authors urge field tests as aid in economic analysis of method

by C. M. Davis* and H. Coffer*

THE recovery of petroleum by primary methods of field exploitation is estimated at approximately 30-40 per cent of the original oil in place. Much of the oil remaining underground is the cause of inefficient ways of production; also capillary forces and adhesive retention of the oil are responsible for some of the crude remaining in place. In earlier times advantage was not taken of the expansive energy of the dissolved gas, the static pressure of edge water, and other forces.

The employment of secondary-recovery methods have proved effective in getting increased recoveries. However, in many instances only 50-60 per cent of the in-place oil has been recovered. Since 40 per cent of the original oil has often times been left in the reservoir it has become a matter of considerable interest, especially in the premium crude areas, to devise means whereby as much as possible of the remaining oil might be produced.

*Division of Petroleum and Natural Gas Engineering, School of Mineral Industries, Pennsylvania State College.

The use of thermal and electrical means should provide a way of expelling the fluids from the reservoir rock by tending to decrease the viscosity of the oil and the surface-tension characteristics of the oil as well as those of the connate water. The electricity should fracture the formation as it has the laboratory cores under investigation.

Laboratory Results

Retorting of a set of cores was carried out as one of the control tests and it was found possible to recover 92 per cent of the in-place oil when heating to 500° C. By following conventional methods of analysis, it was determined the set of cores gave data as presented in Table 1.

TABLE 1—CORE DATA

	Average
Porosity, per cent of total volume	21.9
Oil saturation, per cent of pore space	67.4
Water saturation, per cent of pore space	2.0
Air or gas, per cent of pore space	30.6
Air permeability, md.	59.0
Resistivity (original core, ohm-cm.)	5.1×10^6
Density of oil, °A.P.I.	33.4

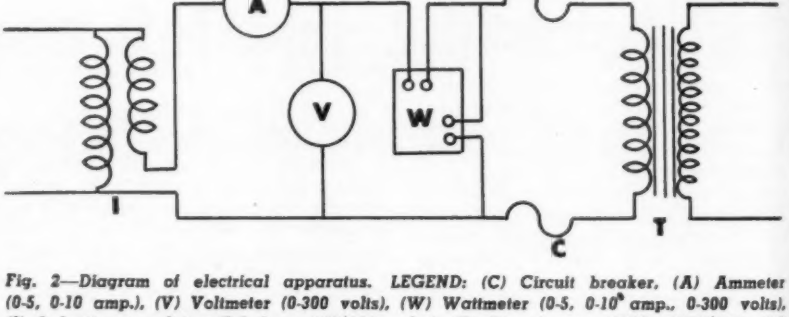


Fig. 2—Diagram of electrical apparatus. LEGEND: (C) Circuit breaker, (A) Ammeter (0-5, 0-10 amp.), (V) Voltmeter (0-300 volts), (W) Wattmeter (0-5, 0-10 amp., 0-300 volts), (I) Induction regulator (7.5 kva. 110/220 volts), (T) Transformer (6900, 2300/220, 110 voltage ratio).

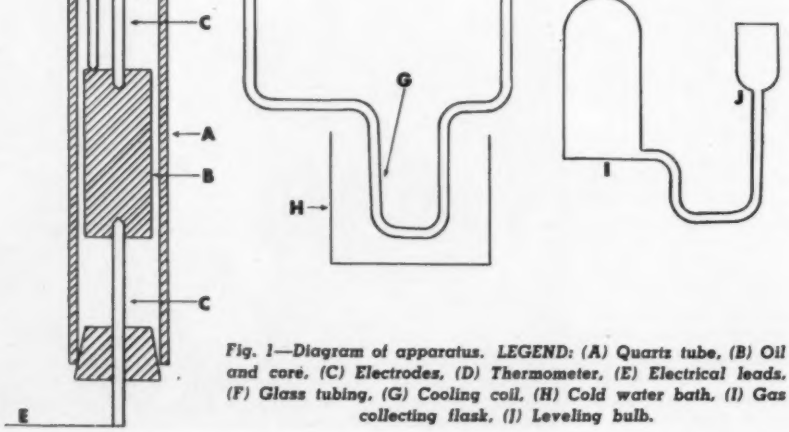
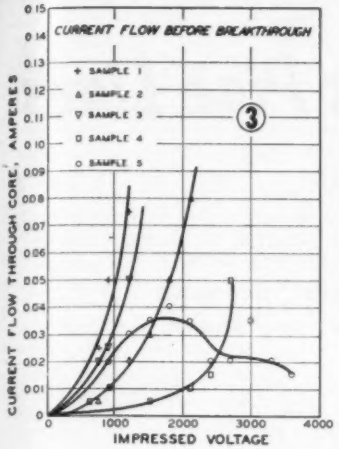
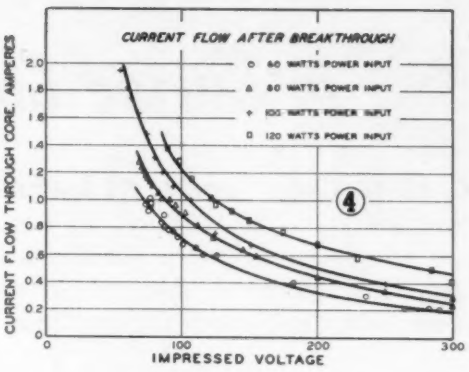


Fig. 1—Diagram of apparatus. LEGEND: (A) Quartz tube, (B) Oil and core, (C) Electrodes, (D) Thermometer, (E) Electrical leads, (F) Glass tubing, (G) Cooling coil, (H) Cold water bath, (I) Gas collecting flask, (J) Leveling bulb.

It has been found that rather high voltage can break down the resistance to the flow of electricity through oil-laden cores. It is considered "breakthrough" is possible initially because of the presence of connate water and carbonization along the path of the current. The breakthrough was determined by putting the oil-laden core between electrodes across the secondary side of a 230/6,900-volt transformer as indicated diagrammatically in Figs. 1 and 2.

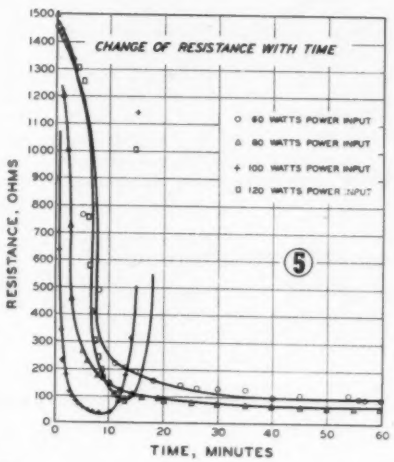
The core was held in the quartz reaction tube between the electrodes and the reaction tube was connected to the process devices. One-quarter-inch steel rods were used as electrodes. Each electrode was firmly inserted into either end of a core which had been prepared by drilling one ¼-in. hole in either end for a depth of approximately ¼ in. Oil was recovered in a satisfactory manner in the bottom of the reaction tube and

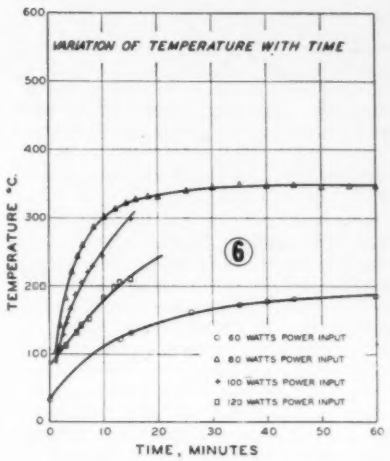



CURRENT FLOW AFTER BREAKTHROUGH
○ 60 WATTS POWER INPUT
△ 80 WATTS POWER INPUT
+ 100 WATTS POWER INPUT
□ 120 WATTS POWER INPUT
4
CURRENT FLOW THROUGH CORE, AMPERES
IMPRESSED VOLTAGE

any gas was collected in a gas-collecting flask.

The oil-laden cores were prepared, weighed, and put into the apparatus. Voltage was impressed across the sample employing an induction regulator to control the voltage. Because of the fact that some of the water had previously evaporated from the core material, it was required to artificially saturate the cores with a 5 per cent salt solution (arbitrarily chosen). It was found at first that the current increased with a raising of the impressed voltage; then the current dropped to no readable value for the instruments at hand. As further voltage was impressed a point was reached where the current surged to very high values almost instantaneously. This was the breakthrough point. With the advent of operating difficulties with the equipment available, the transformer was removed from service after breakthrough and heating was continued with 220 volts. Heating was continued until no further increase in volume of gas was noted in the collection flask. The resistance of the sample became substantially constant at this point. Each experiment was conducted at constant power in an attempt to keep the heating rate constant.





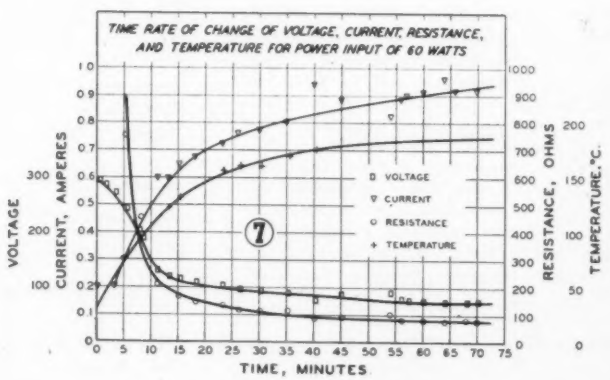


TABLE 2—BREAKTHROUGH POTENTIALS

Length of core, cm.	Electrode spacing, 1.9 cm. in diam.	Salt-water sat.	Breakthrough potential, volts
4.62	3.35	28.7	3,900
3.79	2.52	30.0	2,700
3.70	2.43	17.5	3,600
4.85	3.58	22.5	5,100
4.92	3.75	32.9	4,500
4.79	3.52	24.6	6,000
4.37	3.10	18.8	4,500

TABLE 3—HYDROCARBON RECOVERY

Test series	Power, watts	Per cent of in place oil	Total* per cent of "in place"
1	40	84.1	89.3
2	60	81.5	90.6
3	80	75.8	87.9
4	100	79.5	91.8
5	120	77.2	86.3

*Oil and gas.

The accompanying tables and figures will indicate the nature of the experiments which were carried out.

Tables 2 and 3 show the breakthrough data and hydrocarbon recovery, respectively. Figs. 3-7 present in concise form the electrical operating characteristics and data.

Conclusions

The results acquired at this stage of experimentation for cores 1.9 cm. in diameter and about 4 cm. long and power ranging from 40-120 watts indicate the total hydrocarbon recovery was not greatly affected by the power input. However, gas recovery increased and oil recovery decreased as the power plant was increased.

The conductivity of the sand formation was found to increase rapidly with heating after breakthrough. Breakthrough caused carbonization and fissuring of the cores and conductivity increased with time as the amount of carbon increased. When most of the recoverable oil had been driven off carbonization appeared to cease and conductivity leveled off as long as the temperature of the core remained essentially constant.

Carbonization occurred to the greatest extent on or near the surface of the cores and the temperature appeared to reach its highest point near the electrode contacts.

Acknowledgment

This work was conducted in partial fulfillment of the master's degree in chemical engineering at Missouri School of Mines by H. Coffer under the direction of Prof. C. M. Davis. It was inspired by preliminary work which had been carried out by Erich Sarapou at the Mining Academy at Freiberg, Germany. At present Erich Sarapou is completing his doctorate studies at Missouri School of Mines and C. M. Davis is employed by the Petroleum and Natural Gas Department of the Pennsylvania State College as an assistant professor of petroleum and natural-gas engineering.

SLACK in Buried Gas Pipe Lines

by G. M. McClure* and L. R. Jackson*

Slack, introduced to handle temperature variations occurring before line is covered, can help minimize longitudinal stresses. But once the line is covered with soil, slack offers little or no benefit.

AT present, there is considerable variance in the extent to which the practice of introducing slack is used by various pipe-line constructors.

A portion of this variance arises from the fact that there have not been enough data available to allow a detailed analysis of the role of slack in the performance of a pipe line.

Recently, some of the data required were obtained by Battelle Memorial Institute for Texas Eastern Transmission Corp. on a 20-in. transcontinental line operated by this corporation. Specifically, the longitudinal stresses in the line were measured at a total of 17 locations from western New Jersey to southern Indiana and at different seasons of the year. In addition to the measurement of residual longitudinal stresses in the line, data were obtained on amount of restraint offered by various types of soil to longitudinal movements of the line.

It was found that the longitudinal residual stresses ranged from 18,900 psi. tension to 14,500 psi. compression. These stresses are consistent with what would be expected from temperature variations during the construction of the line. Depending on the type of soil and amount of moisture, the soil restraint ranged from low values to as much as 1,080 lb. per sq. ft. of pipe surface. In all cases, the soil restraint was large enough to absorb stresses observed in less than 100 ft. of pipe.

From the data obtained, it can be concluded that slack, introduced to handle temperature variations occurring before the line is covered, can help to minimize longitudinal stresses; however, once the line is covered with soil, slack is of little or no benefit.

*Battelle Memorial Institute, Columbus, Ohio.

Longitudinal Stress Measurements

The method of determining longitudinal stress is illustrated in Fig. 1. A section of pipe from 20 to 40 ft. long was uncovered as shown in the figure. SR-4-type electrical-resistance strain gages were then attached to the pipe near one end of the uncovered section. Fig. 2 shows a typical strain-gage installation—a longitudinal strain gage "A," a circumferential strain gage "B," and a dummy gage "C." The dummy gage was used both to compensate for temperature changes that might occur while the test was in progress, and to serve as a reference "zero."

After the gages were applied and stable, a zero reading was made.

The pipe was then cut at Locations E and F (see Fig. 1) and a 20-ft. section removed.

Cutting the pipe released the longitudinal stresses present in the section uncovered. Strain-gage readings made after cutting the pipe, when compared with readings taken before cutting, provided the information required for computing the longitudinal stresses relieved.

TABLE 1—LONGITUDINAL STRESSES

Test No.	Date	Longitudinal stress (psi.)	Location
1	3-10-50	+12,300	Western New Jersey
2	3-11-50	+12,200	Western New Jersey
3	5- 4-50	—14,300	Southeastern Pennsylvania
4	5- 4-50	—14,500	Southeastern Pennsylvania
5	5- 5-50	—14,400	Southeastern Pennsylvania
6	5- 6-50	+18,900	Southeastern Pennsylvania
7	6-12-50	— 7,600	Southeastern Pennsylvania
8	6-14-50	— 2,300	Southeastern Pennsylvania
9	6-15-50	— 4,000	Southeastern Pennsylvania
10	6-15-50	— 5,350	Southeastern Pennsylvania
11	8- 8-50	— 5,500	Central Ohio
12	8-10-50	—14,000	Central Ohio
13	8-10-50	— 2,400	Central Ohio
14	8-12-50	— 7,000	Central Ohio
15	8-17-50	— 3,300	Central Ohio
16	8-17-50	— 6,000	Central Ohio
17	9-11-50	— 6,700	Southern Indiana

(+) Indicates tension. (—) Indicates compression.

Table 1 summarizes the values obtained at various locations along the pipe line. Note that stresses may be either tension or compression and the largest stress measured was about 18,900 psi.

Possible Limitations of Test

While the method of stress measurement outlined above appears to be relatively straightforward, there are some limitations to the accuracy that should be mentioned. Some of these arise from the fact that when the pipe is uncovered it is much more

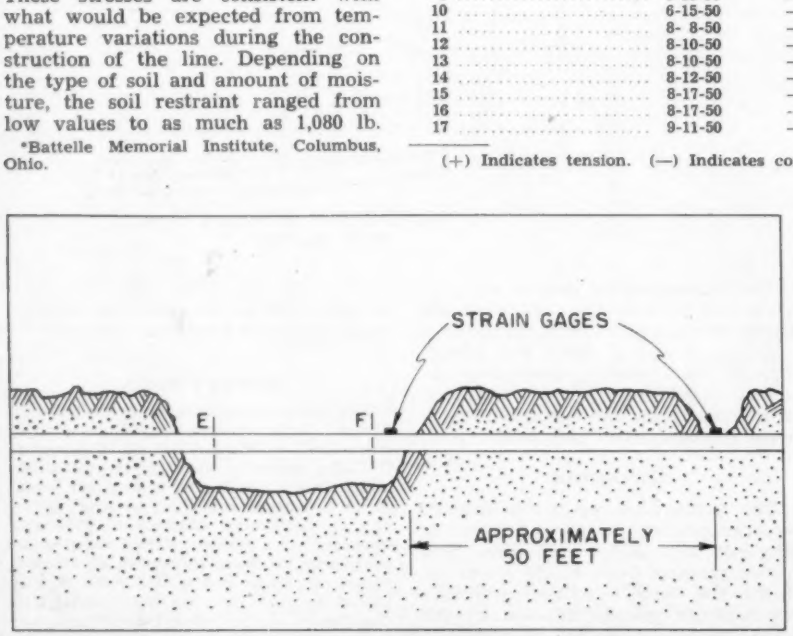


Fig. 1—Strain-gage locations.

susceptible to variations in ambient temperature than when it is buried. Thus, if the ambient temperature changes sharply between the time the pipe is uncovered and the gages are attached, extra thermal stresses will result. Furthermore, the temperature of the compensating "dummy" gage is seldom exactly the same as that of the pipe, so that temperature compensation is not always perfect.

A third disturbing influence arises from the fact that in some locations there were indications of some bending stresses in the pipe. That is, when the pipe was cut, the cut ends no longer remained in line.

While these effects mentioned above do introduce some uncertainty in the interpretation of strain-gage readings, it is believed that actual stresses present in the buried pipe are reasonably close to the values measured, and, in any cases, are no larger.

Measurements of Soil Restraint

Some measurements of the restraining effect of the soil were obtained in the following manner. Referring to Fig. 1, when a section of pipe was uncovered, as described above, a test pit was dug down to the pipe about 50 ft. from the main excavation, as indicated in the figure. Only the top surface of the pipe was uncovered in this pit.

Strain gages were attached to the exposed pipe in the same manner as in the main excavation.

The basis for measurements was the idea that when the pipe was cut in the main excavation, if the soil between the cut and the test pit exerted no restraint, the gages in the pit would indicate the same stress relaxation as those near the cut. On the other hand, if the gages in the pit showed no relaxation, the soil between the cut and the test pit would be absorbing all the stress. Actually, for pits about 50 ft. from the main excavation, the soil absorbed only part of the stress. In Table 2, the amount absorbed is given and the corresponding restraint is computed in terms of pounds per square foot of pipe surface.

It will be noted in Table 2 that the restraining effect of the soil was as high as 1,080 lb. per sq. ft.

It would be expected that the effect would vary with time of year, amount of moisture in the soil, etc. It might also be expected that, over long periods of time, there would be some creep.

A general description of the soils encountered is given in Table 2. It will be noted that there is no apparent relation between the type of soil and the restraint provided, although one would be expected. It is possible that the exact amount of moisture in the soil and the roughness of the pipe coating are more important in determining restraint than the type of soil.

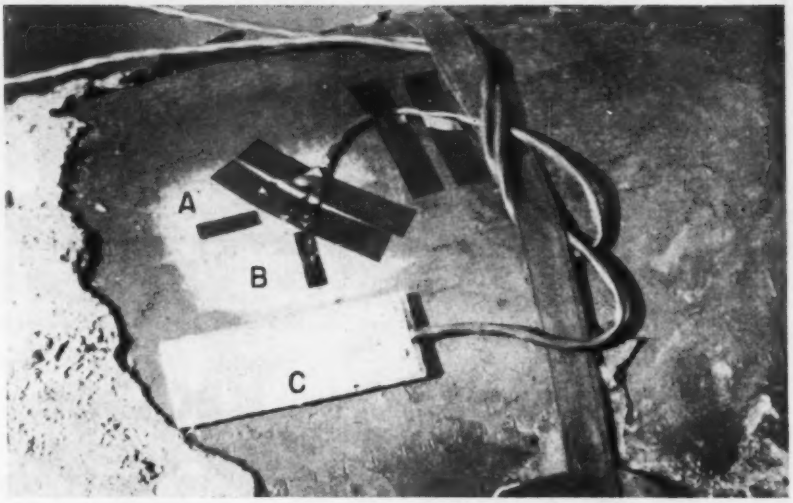


Fig. 2—Typical strain-gage installation.

Significance of Soil-Restraint Values

The figures for soil restraint as computed depend on the assumption that originally the longitudinal stress in the pipe at the location of the test pit is the same as at the main excavation. This assumption does not appear to be unreasonable except that it does not take into account the bending stresses mentioned in the discussion of stress measurements.

This fact may introduce some error in the computed values. For practical purposes, this error is not serious since, as is shown below, the actual restraint required is much lower than the potential restraint the soil can offer.

The main value of soil restraint is to prevent movements of the pipe in the soil as a result of changes in stress or temperature. Consider a 1,000-ft. length of 20-in. pipe with $\frac{7}{16}$-in. wall.

An average temperature rise of 30° F. would cause this length of pipe to expand about 0.21 ft. In order to prevent this amount of expansion, a compression stress of about 6,500 psi. would have to be applied, say, at the end of the pipe section. For a $\frac{7}{16}$-in. wall 20-in. pipe, such a stress would involve a load (L) computed by the relation:

$$L = \pi \times 20 \times \tfrac{7}{16} \times 6{,}500 = 127{,}000 \text{ lb.}$$

This is the load that would gradually be absorbed by the soil along the 1,000-ft. length of pipe. The total surface area A is:

$$A = \pi \times 20/12 \times 1{,}000 = 5{,}240 \text{ sq. ft.}$$

(Continued on page 118)

TABLE 1—SOIL RESTRAINTS

Test No.*	Pipe wall (in.)	Longitudinal stress‡ Stress (psi.)	Feet	Soil restraint (lb./sq. ft.)	Soil conditions
1	$\frac{3}{8}$	8,600	50	775	Clayey sand, damp, many rocks.
2	$\frac{3}{8}$	9,360	50	840	Sandy clay, fairly wet, few rocks.
3	$\frac{7}{16}$	14,300	50	1,080	Heavy clay with very little sand, very wet, no rocks.
4	$\frac{7}{16}$	7,260	50	545	Sandy clay, damp, few rocks.
5	$\frac{7}{16}$	14,400	50	1,070	Heavy clay with very little sand, fairly wet, no rocks.
6	$\frac{7}{16}$	12,800	50	955	Sandy clay, fairly wet, few rocks.
7	$\frac{3}{8}$	2,200	50	198	Clayey sand, damp, many rocks.
8	$\frac{3}{8}$	1,520	40	171	Sandy clay, fairly wet, no rocks.
8A†	$\frac{3}{8}$	2,320	80	131	Sandy clay, fairly wet, no rocks.
9	$\frac{3}{8}$	820	40	92	Heavy clay with very little sand, fairly wet, no rocks.
10	$\frac{3}{8}$	4,550	45	455	Sandy clay, fairly wet, few rocks.
10A†	$\frac{3}{8}$	5,350	90	289	Sandy clay, fairly wet, few rocks.
11	$\frac{7}{16}$	2,500	90	113	Heavy clay with very little sand, fairly wet, no rocks.
12	$\frac{7}{16}$	4,000	18	835	Sandy clay, fairly wet, no rocks.
13	$\frac{7}{16}$	600	48	47	Sandy clay, fairly wet, no rocks.
14	$\frac{7}{16}$	1,000	25	150	Sandy clay, fairly wet, no rocks.
15	$\frac{7}{16}$	2,400	42	214	Heavy clay, with very little sand, fairly wet, no rocks.
16	$\frac{7}{16}$	4,700	35	504	Heavy clay with very little sand, very wet, no rocks.
17	$\frac{7}{16}$	5,600	60	350	Clayey sand, very wet, some gravel.

*Locations here are the same as those in Table 1. †At these locations, two test pits were dug at the indicated distance away from the main excavation. ‡Adsorbed by soil in indicated feet of coverage.

This combination walk and pipe rack when knocked down for moving occupies little space.

View of walk structure showing rack panels attached to top and bottom sills with clips.

"Package" Pipe Rack

Novel construction facilitates ease in moving

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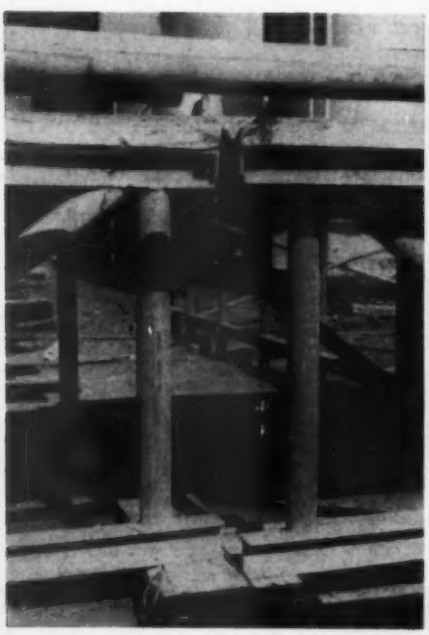
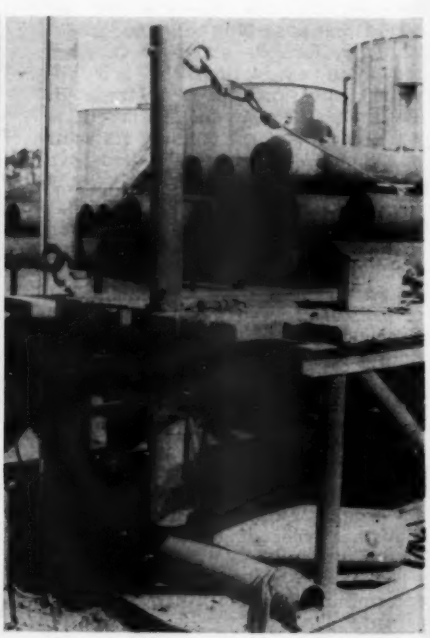
The pipe rack itself is built on both sides of a two-section walk which forms the core of the entire structure. These two walk sections are made with structural steel I-beams for top and bottom sills and 4-in. pipe columns to bring the top of the walk to the desired height. Both sections have the same over-all length but the part designed to butt against the substructure of the derrick is 1 ft. wider than the other section.

The derrick section is approximately 7 ft. wide so that seven undressed floor timbers can be bolted to crossmembers. The second section contains six similar floor timbers, also bolted permanently in place upon the crossmembers of the structure so that it is unnecessary to lay a new floor each time the tools are rigged up. Joining of the two sections is accomplished by bolting through matching plates welded only to the top sills. The purpose of the different widths of the two sections is to nest the narrow section into the wider one when moving. When moving is to be done, the wide section of the walk is overturned so the planking of the walk is against the ground. The other section is also overturned, lifted up, and

(Continued on page 118)

Left: Side panels for the walk are supported on wooden sills. Alignment of walkway is made by varying sill heights. Center: Connection at the outer end of the pipe rack panels. Right: When preparing to move the walk and rack structure the "high-line" post may be quickly detached.





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Right: NO-OX-ID can also be applied cold, by hand. Your coating crew will like working with NO-OX-ID. No heating kettles necessary.

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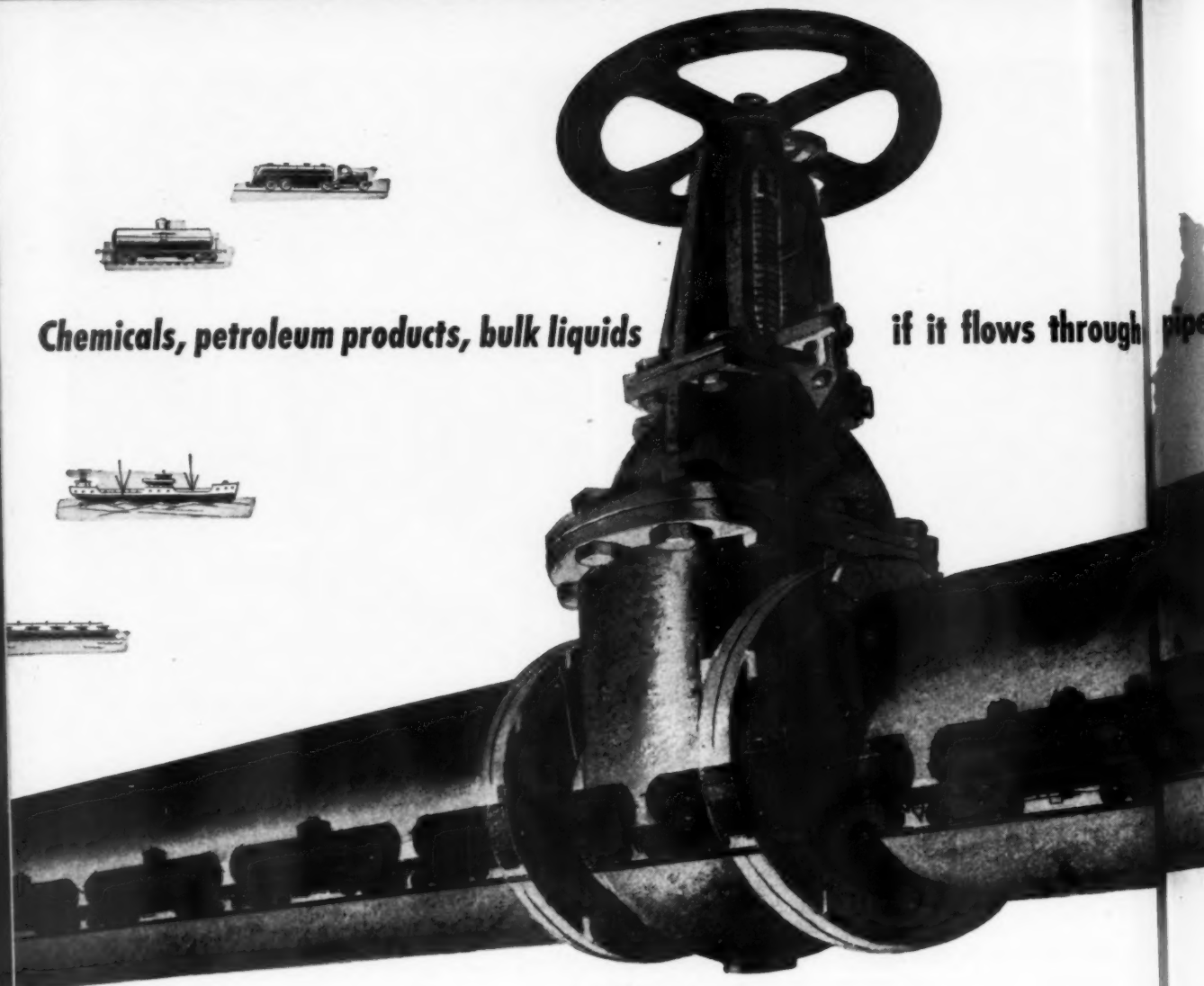

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Installation, Operation and Maintenance of

Mechanical-Drive Steam Turbines

by William B. Yard*

THE installation of steam turbines has a decided influence on the future performance of that equipment. Steam turbines today are ruggedly designed, precision-built, high-speed machines which, if correctly installed, will operate satisfactorily for many years. The men responsible for their installation should have a working knowledge of their basic design and general operating characteristics to intelligently supervise their installation.

To install properly a steam turbine, a substantial, rigid foundation should be prepared. This foundation is normally made of concrete and is isolated from other foundations carrying rotating or reciprocating apparatus. The turbine is secured to the foundation by means of foundation bolts embedded in the concrete with ample allowance for shims between the turbine and the foundation to permit adjustment in alignment of the turbine with the driven apparatus.

The alignment of the turbine with the driven unit is very important and very little reliance should be placed on the flexible coupling for the correction of misalignment. A steam turbine should be aligned, first, when the turbine and driven machine are cold and then, again, when the turbine and driven machine are at normal operating temperatures. The turbine should then be carefully doweled in place so as to prevent, as far as possible, future movement of the turbine. Modern-day designs, which center line bearing supports, reduce the variation in the alignment between hot and cold but, regardless of this, a careful recheck of the alignment should be made when the equipment is at operating temperatures.

The next item of importance in the installation of the steam turbines is the steam piping to and from the turbine including the protective devices incorporated therein. In Fig. 1 is illustrated a recommended piping arrangement for a steam turbine. It will be noted that the high-pressure steam line is taken from the top of the steam header so as to eliminate, as far as possible, entrained water in the steam supplied to the turbine. The steam line is made in the form of a loop which absorbs the stresses set up in the piping due to temperature changes. The shutoff valve is located in the steam line just ahead of the turbine so that the operator can be close to the turbine and observe its operation during startup. This shutoff valve is also required so that live steam can be shut off at the turbine inlet flange so that normal maintenance, inspection, or replacement of parts can be made without shutting off the steam in the main header.

The drain line immediately ahead of the shutoff valve is required to drain the accumulated condensate in

*Manager, Mechanical Drive Turbine Division, Elliott Co. Paper delivered before National Gasoline Association of America, Big Spring, Tex., February 23, 1951.

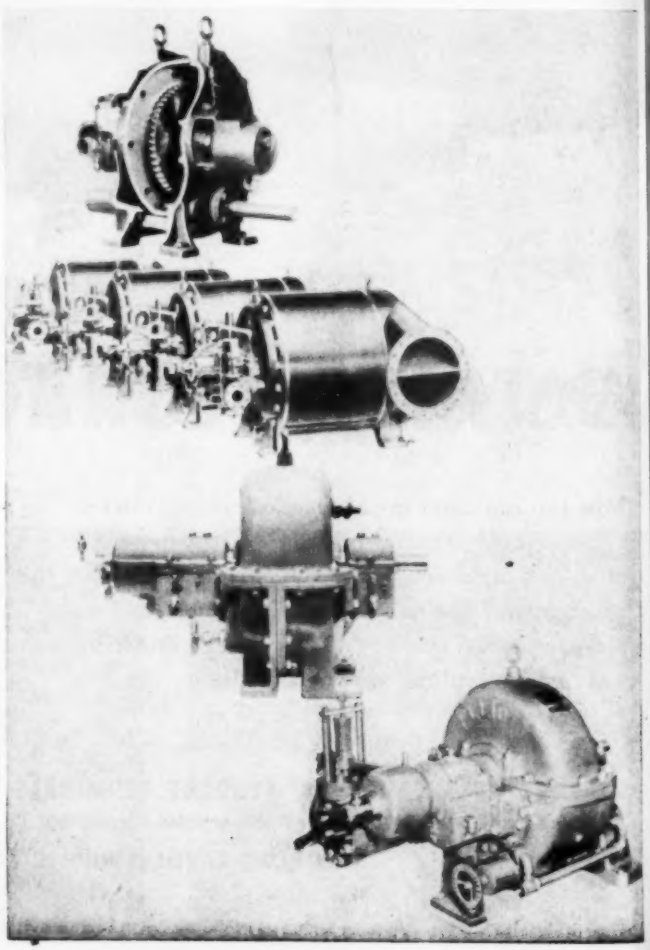


Fig. 2—Fifty years of progress with mechanical-drive steam turbines! At top is original Pelton-wheel-design turbine. The next development consists of several stages and the conventional nozzles and buckets arrangement. In the early 1920's came the first attempt at mass production of single-stage turbines which is shown in the third picture. This was followed in the 1930's by the fourth turbine shown which was mass-produced for high pressures and speeds.

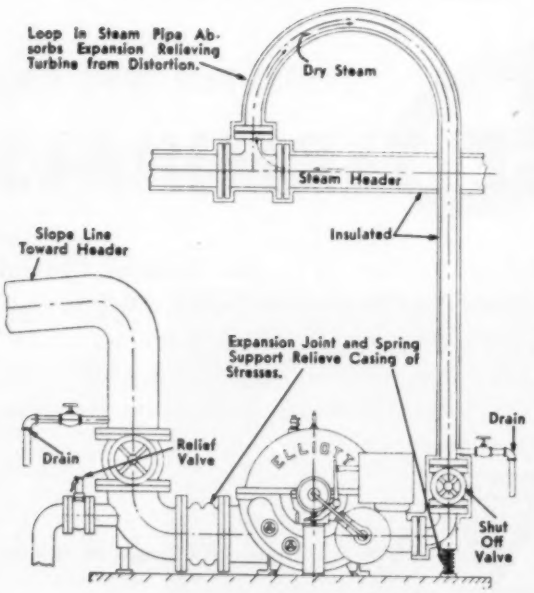
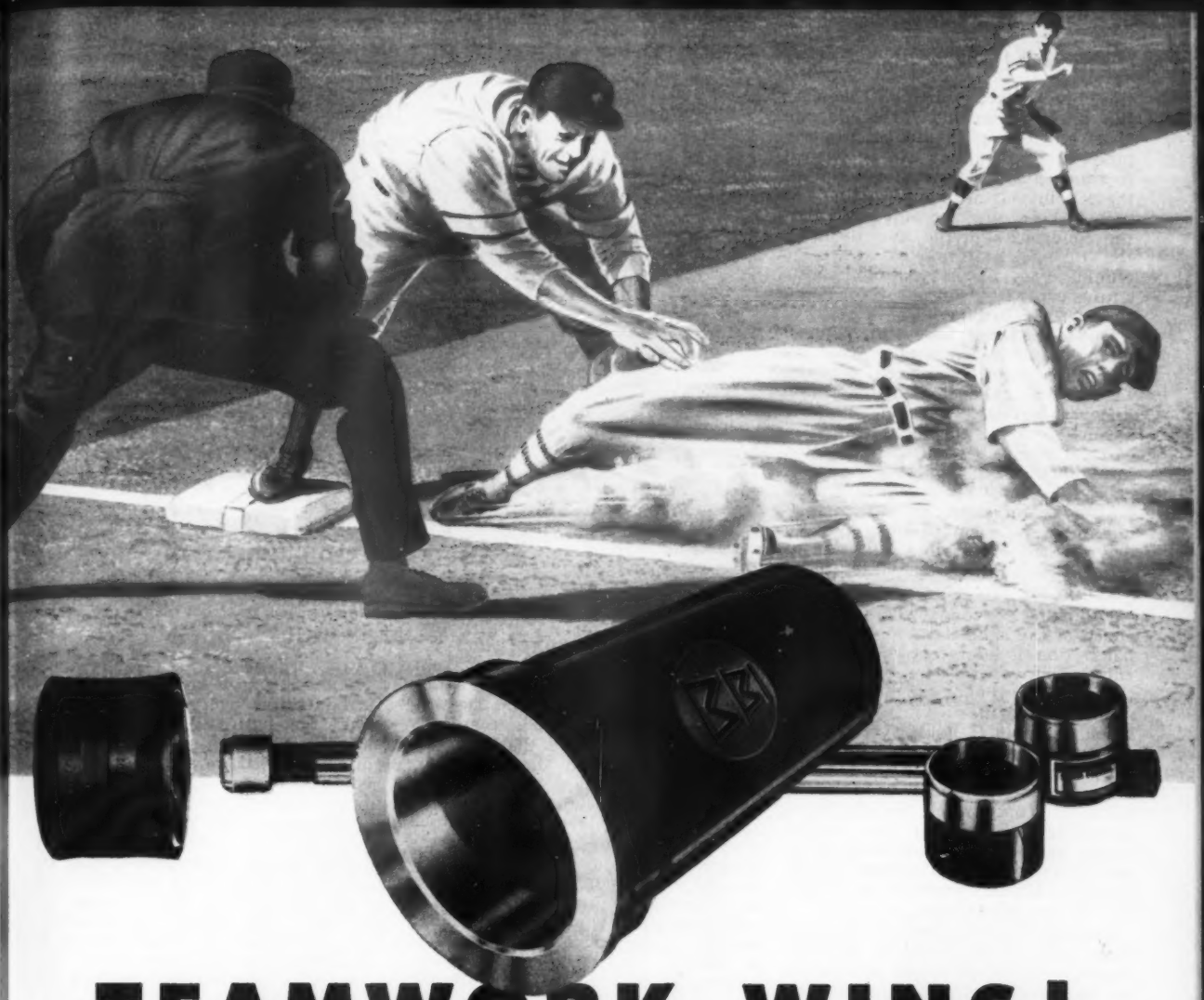


Fig. 1—A recommended steam and exhaust pipe arrangement for a steam turbine.



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this line before starting. Likewise, the drains from the turbine steam chest and casing should be properly piped up so that they can be opened to remove accumulation of water at these points. It is important that the turbine be properly drained and that the condensate in the line ahead of the turbine be removed so as to eliminate, as far as possible, undue strains caused by slugs of water going through the turbine.

Due to the larger size of the exhaust piping, it is recommended that an expansion joint be placed between the turbine exhaust flange and the exhaust piping, to remove piping strains from the turbine casing. The exhaust piping beyond the expansion joint should be supported and anchored as illustrated. Piping strains on the turbine casing may cause misalignment between the turbine and drive machine and, under some conditions, may even cause fracture of parts on the turbine.

Following the expansion joint and ahead of the shutoff valve in the exhaust line is an atmospheric relief valve. This valve should be designed to pass the maximum quantity of steam which the turbine will pass when maximum steam pressure is applied to the turbine inlet and the shutoff valve is closed in the exhaust line. The valve should be designed to be fully open when the maximum allowable pressure on the turbine casing is reached. This pressure is usually considerably in excess of the normal exhaust pressure at which the turbine is operated.

Summarizing this general arrangement, it is noted that a primary endeavor is to eliminate strains on the turbine casing, protect the turbine from excessive exhaust pressures, and make it possible to work on the turbine without shutting down the entire plant.

Operation of Turbine

After the unit has been properly installed, the operation of the steam turbine is a relatively simple and routine matter. Before starting the turbine, the operator should make sure that the steam line and turbine casing are drained of any accumulated condensate, the exhaust line is open to the header, the bearing reservoirs are full, and the oil rings are free to rotate properly. The turbine emergency trip valve should be manually tripped to insure proper functioning in case of an emergency during operation.

With the simple and rugged construction of a single-stage turbine equipped with mechanical shaft governor, it is not necessary to warm up the turbine casing or lubricating system and slowly bring the unit up to speed. Instead, it may be put to work as fast as the steam valve can be opened. As the turbine comes up to speed, the operator should be sure that the turbine does not show any signs of vibration or unusual noises.

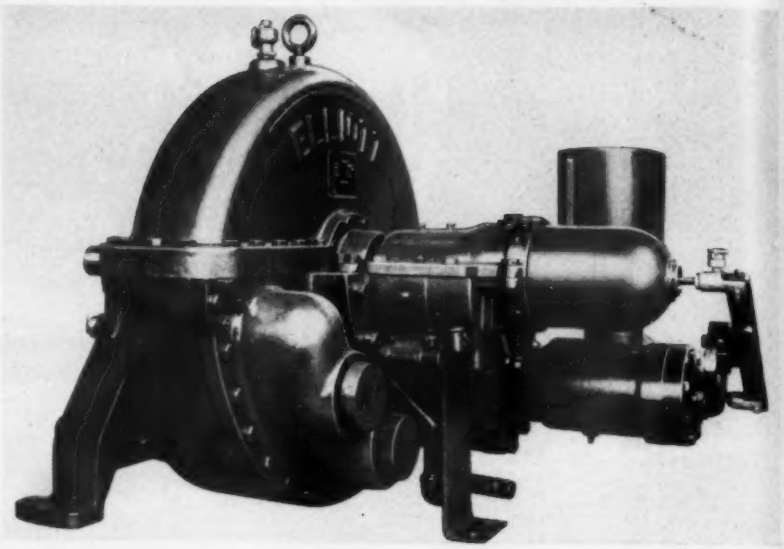

Fig. 3—A postwar turbine featuring rugged construction, enclosed governors, and centerline supports.

After the unit is running and before it is placed permanently on the line, the governors should be carefully checked to make sure that they are working freely and the emergency overspeed trip should be checked by overspeeding the unit to make sure that this safety device will function properly in an emergency. After the unit is in operation, it is only necessary to make periodic checks to make sure that all working parts are properly lubricated, that no signs of distress are apparent, and that the unit is generally operating smoothly. The most obvious indications of trouble are vibration and unusual sounds. Any vibration can be felt or seen most readily at the end of the governor spindle.

Maintenance Details

The third part of this discussion has to do with the normal maintenance of the steam turbines and although manufacturers would like to have care taken of it like a mother takes care of a new-born child, it is realized that the application of the turbine will determine the permissible maintenance. The installations usually involved require continuous operation over long periods of time during which shutdowns are not permitted. With this in mind, weekly or monthly inspections cannot very well be recommended which would involve tripping the unit out by overspeeding, inspection of the bearings, checking the properties of the lubricating oil, cleaning the governor parts, and checking unit alignment. Instead, a careful and complete inspection is recommended during each shutdown period so that any worn or damaged parts are replaced with a minimum of inconvenience. An ample supply of normal wearing parts should always be on hand for such occasions.

If these shutdown periods are as infrequent as every 6 months to a year, the entire governing system should be dismantled, cleaned, carefully inspected, and all worn parts replaced. The clearance of the moving parts should be carefully checked to determine the condition of the main journal bearings and thrust bearing and all worn parts should be replaced. The packing glands should be opened and the carbon rings inspected to see that they are functioning correctly as an accumulation of impurities carried over from the boiler may readily freeze the rings in one position and make them inoperative. Note that the sealing surfaces are both along the shaft and on the vertical partition separating the rings.

Normally, it is not necessary to open up the casing to inspect the rotor nozzle ring, etc., unless the unit is operating on wet steam or if the steam is contaminated. At times when lack of power is noted, it is advisable to inspect these parts to determine whether or not the steam passages are worn or possibly clogged by impurities from the steam.

After this inspection, the turbine should be reassembled and adjusted in accordance with the detailed instructions provided in the manufactureres' instruction book. It is assumed that the men who actually do this work have had access to the manufacturers' instruction book where detailed written instructions supplemented by illustrations are available.

So far, the problem has been discussed from the operator's standpoint. In the following discussion the subject is investigated from the manufacturer's standpoint. The operating conditions for turbines are rapidly changing as a result of increased speeds of driven machines,

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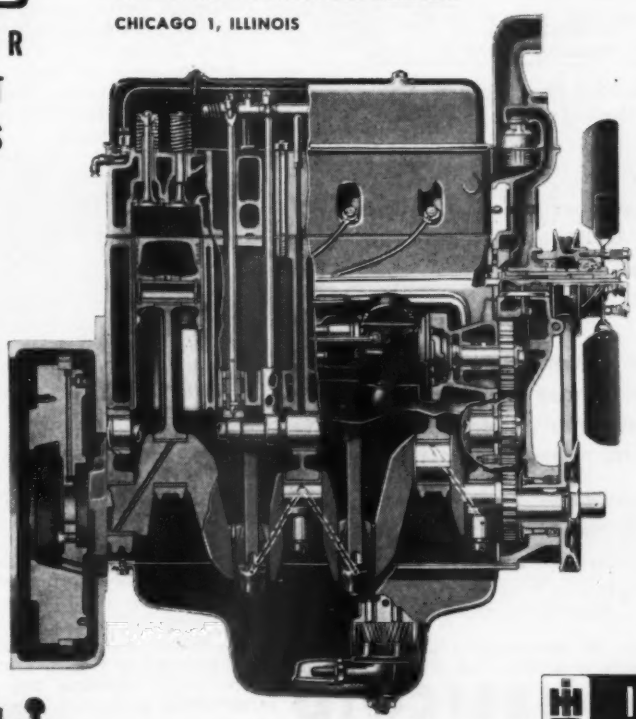

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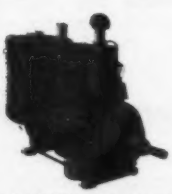
U-4, 28.5 A.P.I. max. hp at 1800 rpm

U-1, 10.5 A.P.I. max. hp at 1800 rpm



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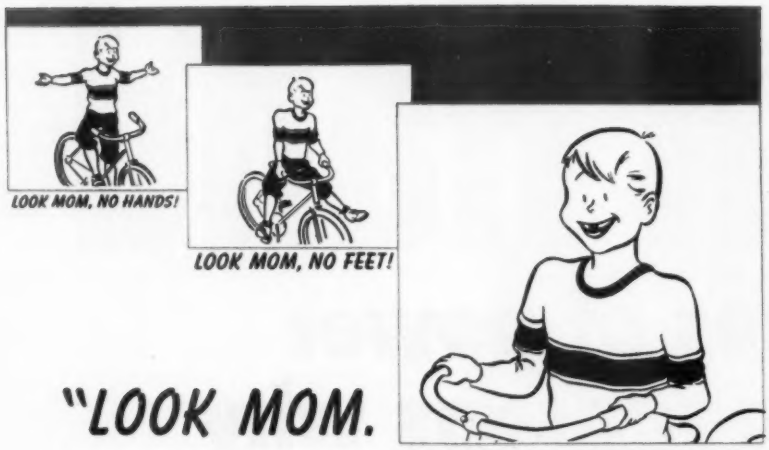

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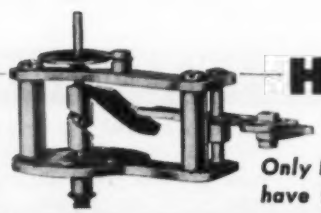

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superimposed steam-generating plants, and a general trend toward higher over-all plant efficiency. It is, therefore, an obligation of the manufacturer to modify his turbine to meet these changing conditions and in doing so incorporate in his design any new or desirable features which will assist in the installation, operation, and maintenance. These modifications, however, must be made with a minimum expense so that the added cost to the original installation is not increased in excess to the resultant reduction in the cost of the operation and maintenance of the modernized turbine.

In Fig. 2 is illustrated the progress made in mechanical-drive steam turbines over the past 50 years. At the top in Fig. 2 is the original Pelton wheel design turbine which, obviously, is suitable for only low-pressure, low-temperature steam, low speed, and small ratings. This is one of the original single-stage steam turbines manufactured in this country.

The next development is a turbine using the now conventional design of nozzles and buckets and consisting of several stages. The stages are made in what is most aptly described as doughnuts, and are bolted together through bolts around the periphery of the turbine parallel to the axis. This, obviously, is a relatively crude design, good for only low pressures and temperatures, low speeds, but is aimed at obtaining relatively high over-all efficiency.

The next picture shows a turbine manufactured in the early 1920's which was the first attempt at mass production of single-stage mechanical drive turbines. This design drastically reduced the initial cost as compared to previous turbines but it, likewise, was designed for low pressures, temperatures, and speeds. As a result of progress made in associate equipments, this turbine soon became obsolete and was replaced in the 1930's by the next turbine.

This turbine was designed for modern-day pressures and for speeds which were considered high at that time but which subsequently proved to be conservative. The design of this turbine stressed the low-cost mass production resulting in interchangeability of replacement parts.

This line of turbines was again replaced following World War II by a modern and up-to-date version as illustrated in Fig. 3. This is an external view showing the rugged construction, centerline supports, enclosed governors, and other features.

Europe's Largest Refinery

(Continued from page 83)

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/essels was followed by their assem-)ly during the autumn months.

The completed maintenance and warehouse building has been in use for several months as a storehouse and workshop during construction. A modern construction camp houses about 750 skilled workers hired from outside the immediate Fawley-Southampton district. The total construction force reached a peak of 4,600 in September.

In addition to adequate restaurant facilities capable of producing 1,000 meals at one time, construction workers have had available to them many of the recreational facilities planned for the operating personnel of the completed refinery. A permanent club building comprising billiards rooms, lounges, game rooms, and a 500-seat cinema has been operating for several months.

Refinery Expansion

Increased gas production from stepped-up fluid catalytic cracking operations will justify the installation of a catalyst polymerization unit which will upgrade cracked gases to high-octane gasoline components. New treating facilities will be added for the production of tractor fuel. This will entail some increase in crude runs.

Plans for the lubricating-oil plant call for four processing units—propane deasphalting, propane dewaxing, phenol extraction, and clay contacting. The new plant will produce high-viscosity-index stocks and low-cold-test lubes in sufficient quantity to satisfy all of Anglo-American's requirements. The lubes will be solvent refined from Middle East and other selected crude oils.

Equipment and materials for this second construction phase will also be purchased so far as possible, from United Kingdom sources. Completion of the entire project is tentatively set for 1953.

Cost Estimates Reduced

The Fawley project represents an investment of private capital since no ECA finance is involved. Throughout the first 18 months of this 3½-year project, one of the primary requisites has been speed. The sense of urgency stems from the fact that Britain must quickly reduce her imports of finished petroleum products to aid in restoring her world-trade balance.

With this object, the new Esso plant will contribute substantially to this program as the new refinery will fill roughly 25 per cent of Britain's domestic needs for petroleum fuels. As much as possible of the estimated 114,000 tons of material and equipment going into the current construction project was purchased in the United Kingdom.

Since the early planning stages, the basic estimate of cost has been considerably reduced. As the project progressed, more definite figures have become available, permitting a scaling down of preliminary cost estimates. Some downward revision attended devaluation of the English pound, as about two-thirds of the first construction phase is being paid for in pounds sterling. Two other factors played important parts in reducing preliminary cost estimates. Good engineering on the part of both Jersey Standard and Foster Wheeler staffs is credited with substantial savings. In addition, British labor on the project has performed with good productivity, employing modern machinery, efficient job training, and advanced construction methods.

Under the supervision of Esso Engineering and Foster Wheeler, eight major subcontractors participated in the current phase of the Fawley construction project. All are British firms, including:

Storage tanks: William Neil & Sons, Ltd., and Whessoe Foundry Co., Ltd.

Marine terminal: Christiani & Nielsen.

Site grading and leveling: Wimpey & Co., Ltd.

Water wells: International Water Corp., Ltd.

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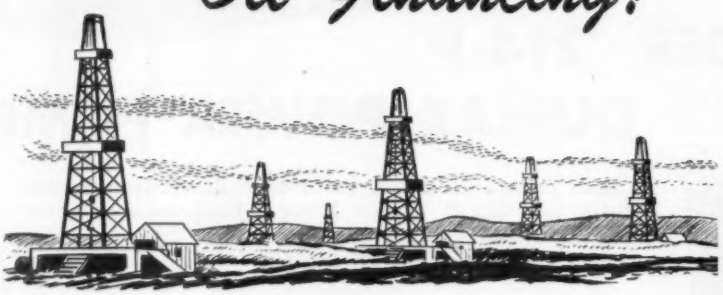

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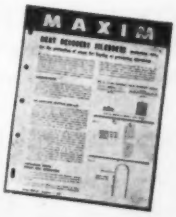

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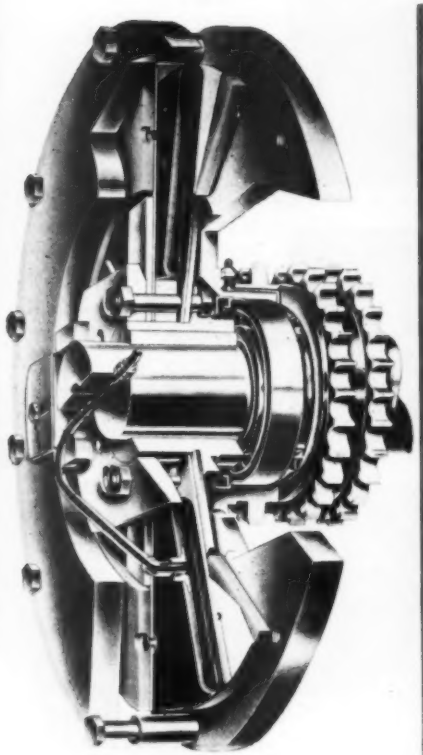

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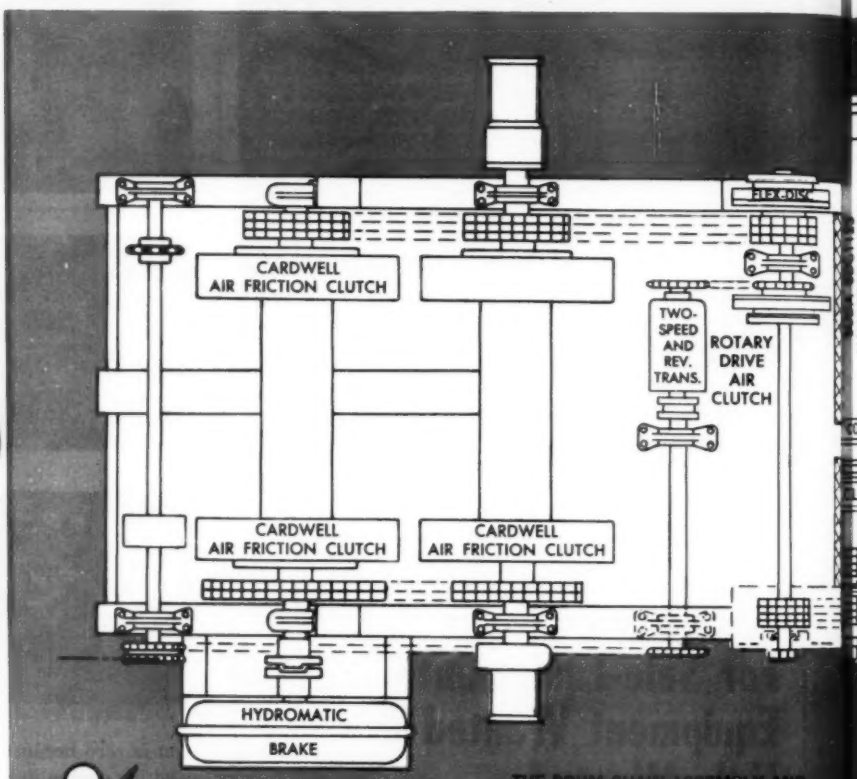

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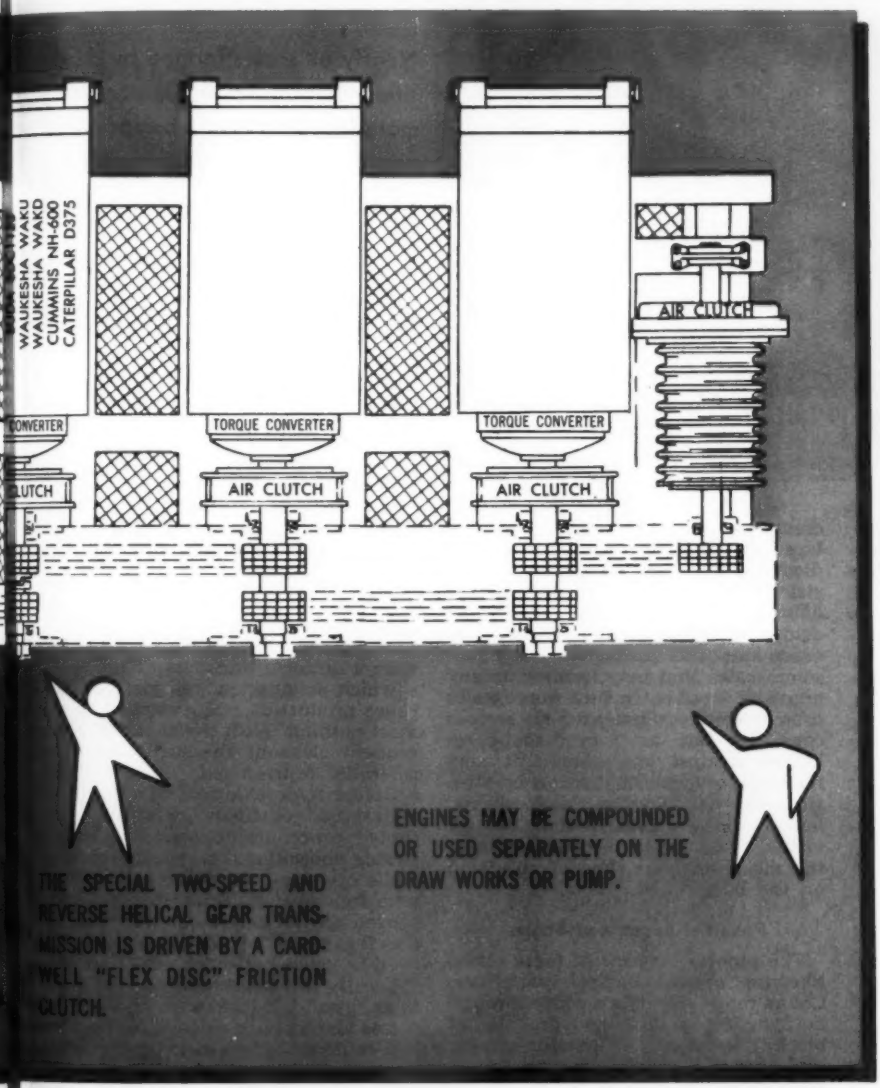

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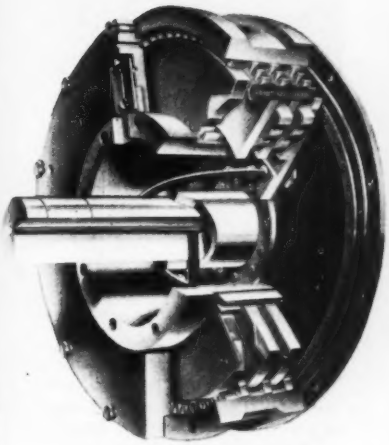

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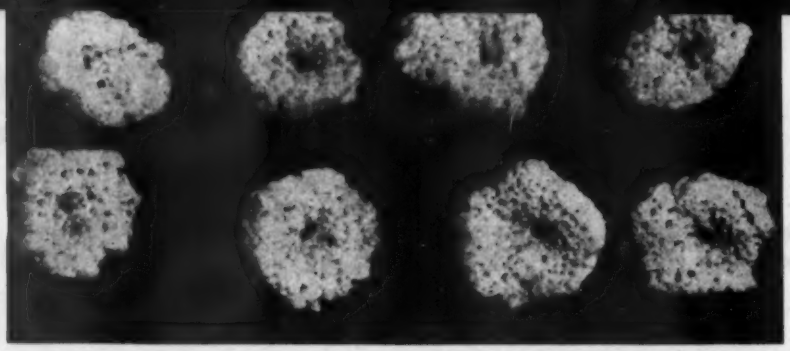

Calcareous

by Zane V. Morgan*

Nearly all scales formed by deposition from oil-field waters are mainly of carbonate composition, and therefore can be removed by acid. A recently developed chemical has proven truly remarkable as a scale preventive, as well as a solvent that removes preexisting scale.

Figs. 1 and 2—Several specimens of carbonate scale that sealed over the casing perforations in a 7,000-ft. Wilcox well on the Gulf Coast.

QUITE similar to the ills that attend man in his declining years are the chaotic seizures that beset many oil fields after the bloom of flush production has faded. Of these a most cumbersome problem is the formation of scale from mineralized water that is being produced. Whether it is called "gyp," "corruption" or just plain "scale" it is and ever will be the carbonate scourge—fed by unlimited sources—that plagues every attempt at trouble-free petroleum production.

There are several factors that contribute to the development of mineral scales and the nature of such depositions comes in infinite variety.

Some scales form throughout the entire tubing string and surface equipment. Some give trouble only from the well-head connections to the gun barrel. Others form on the formation face below the casing. Some scales are hard and others soft. Others may never give any apparent trouble. Indeed, some scales protect the steel equipment from serious corrosion.

Problems Created by Scale

Scales may restrict and completely choke off production in the tubing, flow lines, tubing perforations, at the the sand face or in the casing perforations. Light deposits in pumping wells have been known to flake off from the inside surface of the tubing, fall through the fluid while the well is idle and mechanically foul the pump, an occurrence that often necessitates a stripping job. Some scales create a serious problem due to the large quantity of water being handled. Others cause serious trouble strictly because of the small quantity being produced, in which case a substantial increase in water production eradicates the problem. There are some scales that may never give any apparent trouble, in fact some scales protect steel equipment from serious corrosion. But, as if in diabolic rebellion against any benefit it may render, most scale that forms on steel surfaces will harden and shrink, leaving open crevasses that become virtual dynamos in the generation of the most insidious type of corrosion on the bare metal.

*Engineer, Texas Acidizers, Inc.

Physical Aspects of Scales

The physical aspects of these scales likewise present radical variations. Colors range from pure white through buff, brown, yellow, and gray to jet black, due mainly to metallic oxides, sulfides, and organic matter. Some assume a spongelike friable mass, others a dense glassy texture in the form of needles or spines that splinter under pressure. These may be translucent to transparent.

Another type is a gray compact development that forms on the walls of open-hole wells. This has waxy appearance and may be banded in slightly different shades, probably due to variations in production routine.

In one instance this latter type of deposit was found to be ⅞ in. thick. After a light nitro shot, specimens were recovered which showed large fragments of the sand face with the scale still bonded to them. The curvature of the hole was clearly depicted as the interface between the sandstone and the deposition. The bands were perfectly conformed to this curvature, and it was assumed that most of the hole wall was sealed with a uniform thickness of the scale —which assumption was justified because production had dwindled to almost nothing. With the shot and subsequent cleanout the well was considerably rejuvenated.

Before hydrochloric acid came into widespread oil-field use it was accepted procedure to blast the undesirable depositional material from the walls of open-hole wells periodically with light nitroglycerin charges. This proved quite effective in its removal, the fragments of scale showing an even to somewhat conchoidal fracture.

Locally this deposition was referred to as "gyp," but like most other scales it was almost pure calcium carbonate, and could be removed in short order by acid reaction which soon replaced blasting. Of course, acidization does a more thorough removal job because the acid tends to contact with the scale at all points.

Selective Precipitation

Experimentation in many areas has proven that scale does develop upon the formation face and seal off fluid production. Also, much evidence shows that this type development prevails upon sand formations more so than upon limestones. Waters coming from certain lime formations will precipitate scale upon the steel equipment in the lower portions of the well while the formation itself apparently

Depositions from Formation Waters

Fig. 4—Carbonate material from plugs shown in Fig. 3. Material is only slightly porous. It is quite dense and comparable to concrete in durability.

receives no such precipitation. Thus it seems that precipitation is selective to a dissimilar substance probably due to chemical affinity in the case of the sandstone; and to electrolytic action in the case of the steel and other metals. It is known that precipitation usually starts when water contacts with materials that act as nuclei and which retain charges opposed to the water, and therefore exert polar affinity to the water plus its solution compounds.

Origin of Scale

Before a water-bearing formation is tapped the water lies in a static chemical balance that, due to prevelance of calcium compounds, amounts to a state of full saturation in any given set of conditions concerning pressure and temperature. Generally speaking, the deeper and hotter the formation the greater the concentration of minerals in solution.

Leading back to the origin of such solutions it appears that, because calcium in the form of a sulfate and more especially a carbonate is so vastly abundant in carbonate rocks as well as in transitional calcium silicate minerals of igneous and metamorphic rocks, concentrated solutions are inevitable under the influence of natural agencies.

Calcium carbonate is only slightly soluble in pure water. However, water containing carbon dioxide converts the carbonate into a soluble bicarbonate which is then taken into solution. The amount of bicarbonate that can be taken in is proportional to the amount of CO_2 present. Near the surface under conditions of low temperature and pressure the amount of CO_2 would be very low, but at great depths the temperature and pressure are such that large amounts of CO_2 would be present and the quantity of calcium carbonate dissolved would be proportionally large.

Deposition.—Now, as a formation is tapped and partially depleted of its fluid contents, an ever-changing set of conditions comes about. Because the pressure is released, much of the dissolved carbonic acid leaves the solution in the form of gas, and the calcium carbonate is consequently deposited rapidly and in large quantity. The temperature decrease that takes place as the water leaves its source and approaches the surface hastens these events.

While temperature and pressure changes are the chief factors that bring about scale deposition, two others came into play in some oil fields. These are time and dehydration.

In stripper-well production where

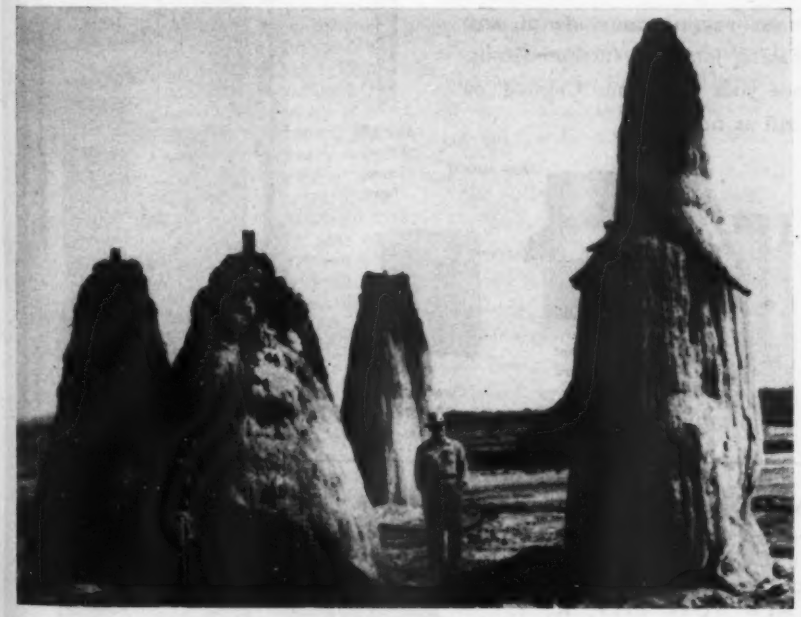

Fig. 3—These carbonate plugs were formed around 4-in. riser pipes that carried the outflow water from gun barrels. A typical plug will develop in 3 years when fed at the rate of 2,000 bbl. of brine per day.

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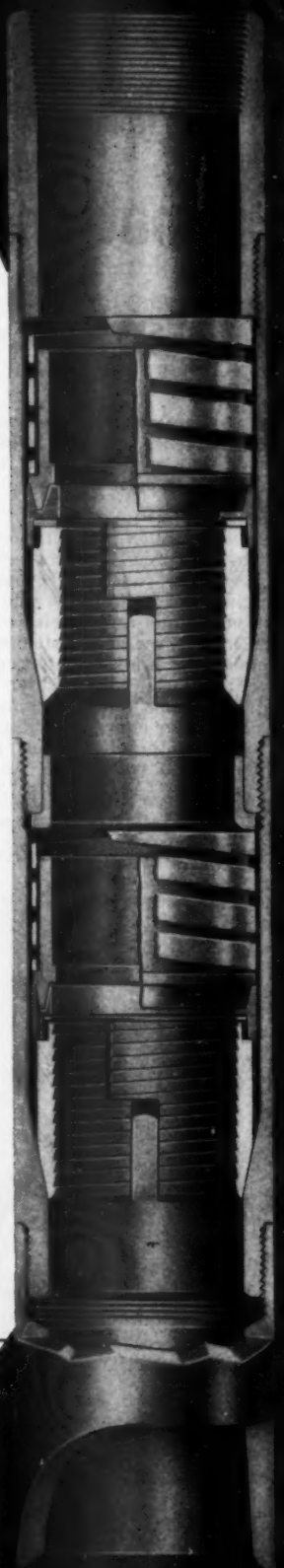

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fluid volumes are very small the time element becomes a major agency. As the fluids are in relatively long contact with tubing and other equipment, considerably more of the total dissolved carbonate will precipitate out.

Deposition Through Dehydration

In conjunction with the time factor in low fluid production, dehydration also becomes important. A simple explanation of this follows, although in some cases it may be much more complex.

With low fluid levels the annular space becomes a heat machine. Warm gases in the lower regions of the hole are moist with mineralized vapors from the formation fluids. These gases are relatively light and tend to rise in the annulus, swapping positions with the cooler, drier, and heavier gases from above. Entering the upper levels, the warm vapors condense and coalesce as water droplets form upon the cooler surfaces of the well equipment. The descending gas takes up vapors as it becomes warmer in the lower zones and the process repeats continuously. The resultant dehydration of water droplets in the annulus gives rise to a scale buildup usually in the form of tubercles which are, in many cases, sources of deep-pit corrosion. Furthermore, the steel surface that is washed by the fluids as they rise and fall near bottoms is subject to similar dehydration and consequent deposition.

Another form. — Dehydration also takes place when dry gas is used in gas-lift production. The unsaturated gas tends to absorb the aqueous phase of produced fluids causing a higher concentration of carbonate which will in turn tend to precipitate out.

As before mentioned some low-volume wells are troublesome because of scale deposition due to the lack of fluid quantity. As an example several wells in one area were constantly beset by pump failure caused by hard flake scale settling down around the upper valve. Sad but necessary, one well was acidized purposely into water to increase the fluid volume. With the water volume increased from 68 to 230 bbl. per day the trouble was almost entirely eliminated. Whereas the former temperature of the effluent water at the surface was 90° F., it increased to 135° F. after acid. Maintenance of this higher temperature reduced the scale development to a negligible issue.

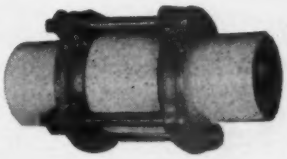
Scale in Perforations

It is frequently conjectured that scale will not completely stop up casing perforations in set-through completions. Figs. 1 and 2 show several specimens of carbonate scale that sealed over the casing perforations in a 7,000-ft. well producing from one of the Wilcox series sands in the Gulf Coast. They were picked up by a hydrostatic bailer. Closer inspection reveals that the part which projected toward the center of the casing is crystalline to fibrous and has a more or less symmetrical cellular texture. This part is easily rent by a knife blade, fracturing along the fibrous cleavages.

A small hole extends through this inner part nearly to the other end where it is completely closed. This hole represents the fluid passageway that permitted fluid entry until it was gradually sealed by the carbonate development adjacent to the sand face. At this point the texture is compacted and amorphous rather than crystalline. Where the hole was closed in this material is dark brown in color probably because of entrapped hydrocarbon material which was forced by pressure into small recesses.

Growth.—As the outward ends of these specimens appear to have been broken off it is assumed that the first deposition occurred within the formation on the walls of the bullet holes. As this deposition progressed it restricted the flow of the fluid which in turn increased the velocity. At the point where the high-velocity jet left the restriction to enter the well an effect of pressure release and consequent cooling would occur. This would promote rapid deposition.

As soon as the deposit progressed



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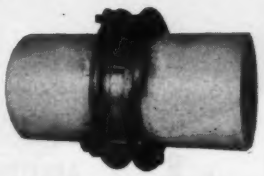

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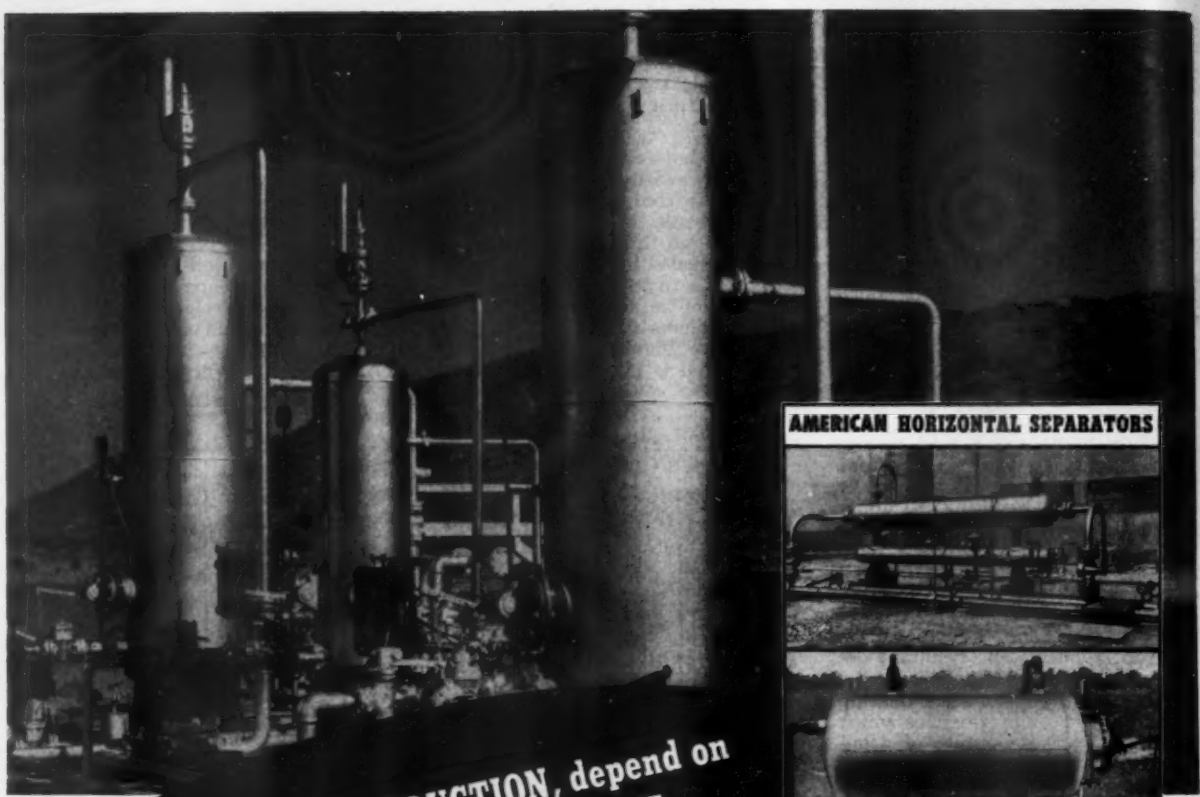

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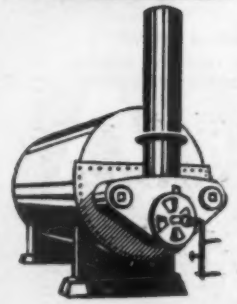

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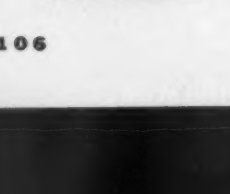

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through the bullet holes in the pipe further development would not be subject to the turbulence and erosion of the jet stream, but would continue in a well-ordered crystalline system. If the jet had not been eventually sealed off at its nether end this development would continue building toward the center of the well bore until it would probably look like a rather fantastic flower bloom growing inward from the casing. The full diameter of these specimens could hardly be much larger than 1 in. where a jet is deflected, and ¾ in. where the jet stream is straight as indicated by most specimens.

The well from which these specimens were taken was originally a high gas-oil producer that was completed in 1947. Production had dwindled to approximately 20 bbl. of oil and 60 bbl. of water per day on gas lift. Bottom-hole pressure of the area had fallen to 1,100 psi. A packer is set below the deepest flow valve. It is believed that the deposition in this well took 6 months in forming, whence it was cleaned out and acid treated.

Rapid Buildups Noted

The total potential carbonate deposition from some formation waters can be an astounding quantity in the course of time. It should be noted that usually only a small percentage of dissolved carbonate is precipitated before the water reaches the ground surface.

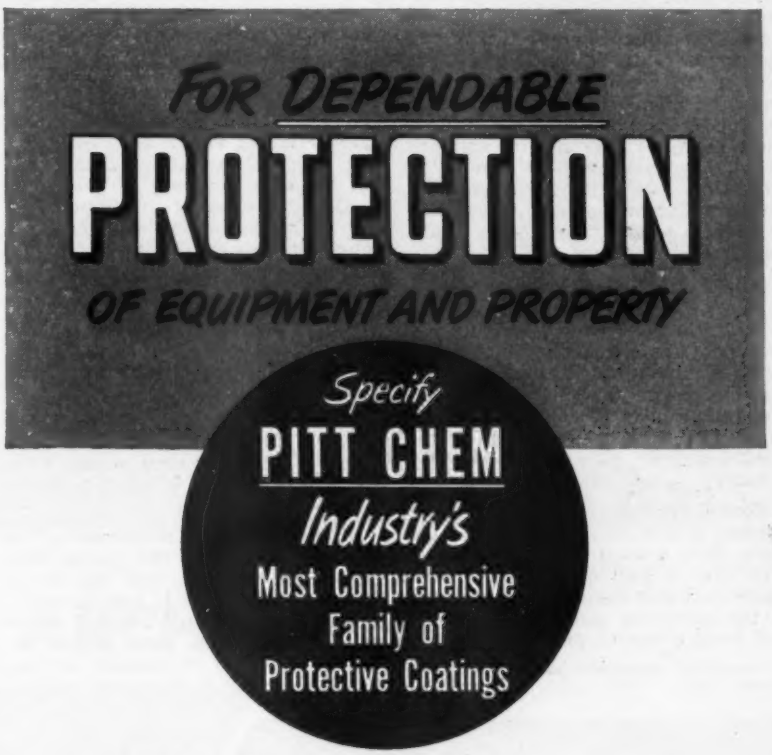
A particularly good example of deposition at the surface is shown in Fig. 3. These carbonate plugs were formed around 4-in. riser pipes that carried the outflow water from gun barrels. A typical plug will develop in 3 years, being fed at the rate of 2,000 bbl. of brine per day. It will be 13 ft. tall, 6 ft. wide at the top, and 14 ft. wide at the bottom with terraces and a solid slab 8 in. thick extending in all directions 40 ft. radially. The material (Fig. 4) is only slightly porous. It is quite dense and comparable to concrete in durability. It is a form of the travertine that develops in the vicinity of hot mineral sprins. Temperature drop and dehydration promote the deposition in such cases.

Scale Prevention Methods

As it would be extremely impractical to maintain near-bottom-hole conditions of heat and pressure until production fluids reach the surface in order to keep well equipment free of scale, and as an ounce of prevention is worth a pound of cure, there appears to be only one other expedient from a preventive standpoint, and that is to treat the water in the bottom of the hole with a chemical sequestering agent that holds down the tendency of the carbonate toward deposition.

In some areas sodium polyphosphates are being used with gratifying results. A recently developed chemical trade marked as "PE" has proven truly remarkable as a scale preventive as well as a solvent that removes preexisting scale. Its effectiveness at extremely low concentrations has made it popular in the Gulf Coast areas where large quantities of water are produced. It is readily soluble in water. On tests with small quantities of this chemical it was found that the PE had permeated downward through 6,000 ft. of fluid (mostly water) in 12 days in a high-fluid-level gas-lift well, rendering protection to the tubing string from the bottom upward. On low-fluid-volume wells the cost of this chemical is only a few cents per day.

Nearly all scales formed by deposition from oil-field waters are mainly of carbonate composition, and therefore can be removed by acid. Those containing insoluble sulfates and silicates will still consist in part of carbonate which, when dissolved by acid, unbinds the insolubles so that they may be removed by fluid action or other mechanical means.



SOUTHWEST TEXAS FAULTS

by H. N. Lyle*

"There is little published information on specific examples of faulting. The attached article summarizes features that are generally recognized as being characteristic of Southwest Texas faults by geologists in this area, and I have attempted to make it understandable to people whose training may have been along other than geological or reservoir-engineering lines."

MOST of the oil fields of Southwest Texas are faulted. Some of the fields, such as Sinton, Saxet, and South Clara-Driscoll have complex fault patterns and many wells must be drilled before the faults can be traced and accurate correlations made between the wells. Other fields may have a single fault, or even none, but in any case faulting is a major factor in the development of oil-trapping structures.

The recognition, interpretation, and plotting of faults is primarily a function of the geologists, but engineers and production men have found that an understanding of fundamental fault characteristics is of assistance in solving some of their own problems. On the other hand, bottom-hole-pressure and production history may be of help to the geologists in establishing fault patterns.

Characteristics of Faulting

Faults in Southwest Texas are associated with certain conditions that help to identify and interpret the faulting. Any particular fault may not exhibit all the enumerated features, but in general the following conditions may be said to be characteristic of faulting in this region.

Normal faulting.—All the faults are normal, which means that the fault plane dips toward the downthrown side, that a well crossing the fault plane must pass from the downthrown to the upthrown side, that the well will have a loss of formation section equal to the vertical movement of the fault, and that any plane such as a sand top that is intersected by the fault will be split and moved laterally a distance equal to the horizontal movement of the fault.

Referring to Fig. 1, Well No. 3 has lost 130 ft. of the normal shale interval between the base of the Greta sand and the top of the Sinton, and the top of the Sinton has been separated laterally a distance of 75 ft. This horizontal separation is called a fault gap because on a map it will show as a vacant space. Any well drilled within the limits of this gap will find part of the Sinton missing, and if the location should happen to fall within the 30-ft. gap between the upthrown base and the downthrown top of the Sinton, it will find the entire 80 ft. of sand section missing. This is what happened to the "N" sand in Well No. 2.

Strike and dip directions. — The strike of a fault in this region may be in any direction, and the downthrown side may be in any direction. Although the regional trend of major fault strikes is the same as the regional trend of formation strikes, roughly parallel to the coast, and although down-to-the-coast faults are more numerous than any other kind, it is never safe to assume that any given fault conforms to the regional pattern.

Geometrically, three points are necessary to determine a plane, and so three wells, not in line, cutting a fault plane are necessary to give the strike and dip of the fault plane. Often enough is known about an area so that one well cutting a fault plane will locate the plane rather accurately, but in other instances the fault will turn or merge with other faults so that it will not be pin-pointed even after several wells have cut it.

Actually, **the term fault plane is a misnomer because the face of a fault is a surface that may be either angular, curved, or plane.** Furthermore, the fault face may be, instead of a single surface, a series of parallel surfaces that form a fault zone. Sometimes a well cutting a fault will show a very sharply defined short section, indicating a zone so thin that it may be considered a surface, while other short sections may extend over a considerable vertical interval of indefinite character, indicating a wider zone of fault surfaces. Under favorable conditions, it may be possible to identify short sections within short sections, and then the fault can be visualized as breaking up into smaller faults or "splintering."

Uniform dips.—The faults of Southwest Texas are remarkably uniform in their dips. The faults of Frio age or younger have dips ranging from 45° to 70°, but the majority of the dips average 50° to 55°. Faults older than Frio are usually somewhat flatter, with 45° being a good average for the dips. The lowest dip of which the writer knows is one of 31° in the Eocene-Wilcox in Goliad County.

If enough control is available, fault planes can be contoured just like any other surface. Several methods of doing this have been published.[1,2] When control is lacking, the fault may still be projected with fair accuracy if an average dip is assumed.

Mapping faults.—To project rapidly the approximate trace of a fault upon a sand map, multiply the interval between the sand top and the fault

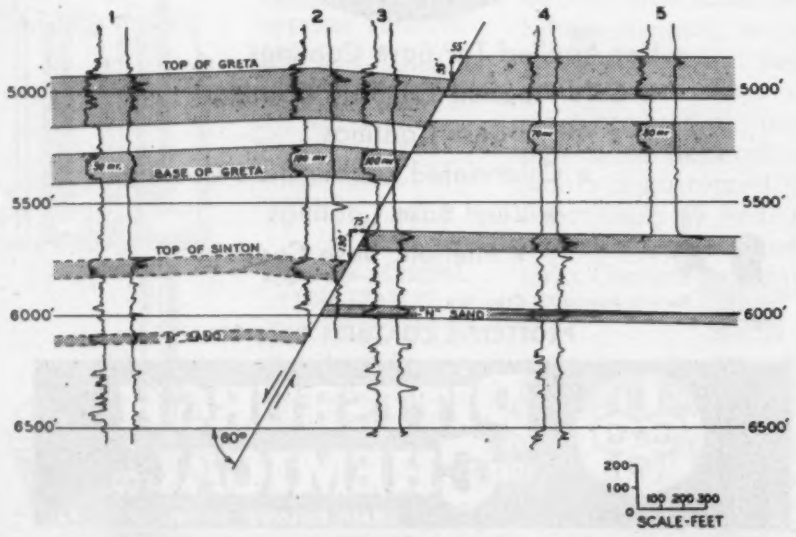


Fig. 1—Typical Southwest Texas fault.

*Consulting petroleum engineer, Corpus Christi, Tex.

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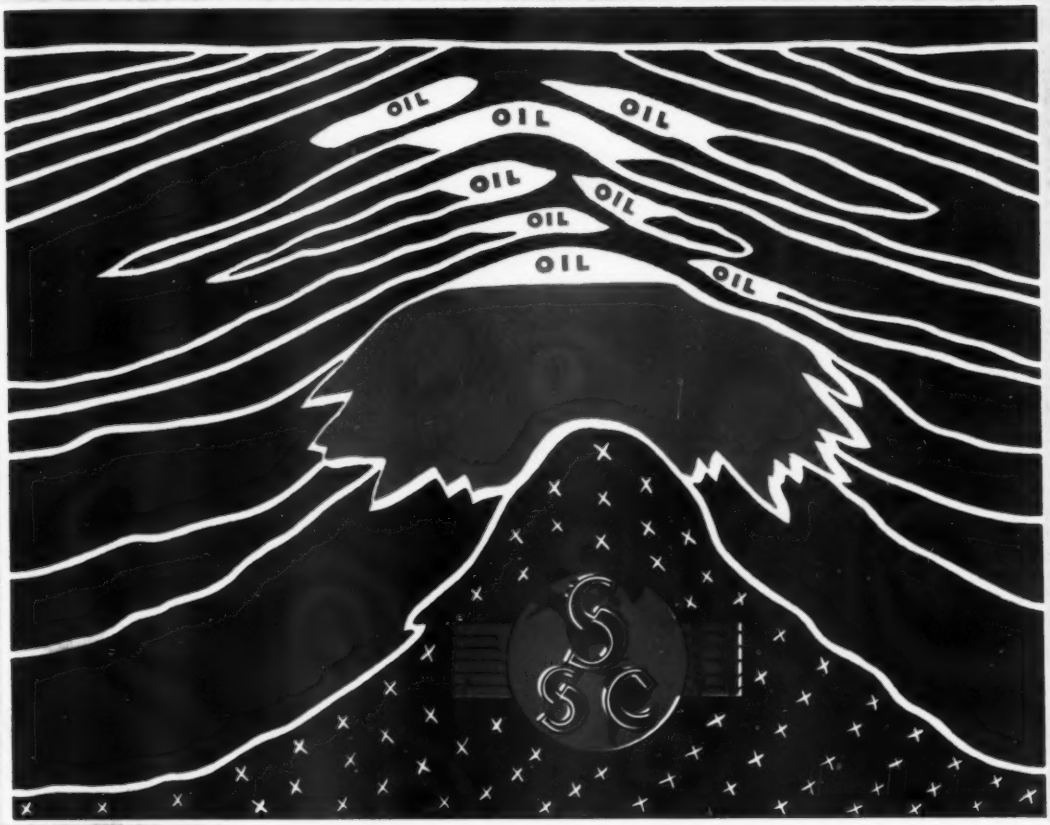

The above sketch is an idealized conception of the general geologic features.

ELECTRA ARCH REEFS

In this area, the reefs occur over the top or shoulders of ... points on an eroded granite ridge. Oil is commonly ... in sands above the reefs or in the upper parts ... the reefs.

The draped structures and associated oil fields are ... complicated. This is due to the influence of the ... prominences on the granite ridge and the ... limbs of the Ellenburger formation on the ... growth. Additional complications are intro... by Strawn sand accumulations farther out ... the flanks of the uplift.

SSC Recommends the Following Approach for Seismic Reef Exploration.

NO. 4. DETAILED AND THOROUGH INTERPRETIVE TECHNIQUES

Buried organic reefs may express themselves in the seismic data by steeply-dipping or discontinuous reflections that often are recorded on only a few traces. In addition, reef trends may not bear any genetic relationship to regional structure. Therefore, an intensive study must be made of anomalous conditions or significant alignments. Trace analysis may have to be applied to some or all of the reflections. SSC personnel are trained to make the DETAILED AND THOROUGH INTERPRETATION required for a successful reef exploration program.

(This is one of a series)

Seismograph Service Corporation

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plane in any well that cuts the fault by the cotangent of the assumed dip. The product will be the radius of a circle with the well as the center to which the fault trace is tangent at some point. Cotangents of 1.0, 0.75, and 0.60 are popular assumptions, representing, of course, faults dipping 45°, 53°, and 59°, respectively. When the fault is found in another well, draw a circle in the same manner around that well. Then the fault trace will be the line that is tangent to both circles. Two circles may have four common tangents, but the proper choice for the fault trace will be apparent. If the sand is on the same side of the fault in both wells, the trace will be one of the exterior tangents, but if the sand is on opposite sides of the fault, the fault will be between the wells and the trace will be one of the interior tangents.

Change in throw with depth.—Another characteristic of faults in Southwest Texas is that they increase in throw (vertical movement) with depth. Perhaps a better way of stating this is to say that they die out toward the surface. Referring to Fig. 1, it is seen that the fault has 130 ft. of throw at a depth of about 5,700 ft., but at 4,800 ft. the throw is only 95 ft. This feature of the faults makes their tracing between wells much more difficult than it would be otherwise.

A favorite place for the faults to die is in the thick Greta sand section, and even the faults that penetrate through it lose a great portion of their throw in it. If the Greta section were uniform, the loss in throw would be fairly easy to recognize and trace, but this formation is a wedge that tapers from several hundred feet in thickness to zero within a dip distance of less than 50 miles. Since this taper is not uniform, but in the nature of rapid change of sand members to shale, it is easy to confuse a change in facies with a loss of section and to assume incorrectly that a fault exists. The only way to guard against an error of this kind is to make correlations over long vertical ranges, and to check the supposedly short sections with the corresponding sections in several wells. Wells on strike with the one being examined offer the best comparisons, but all the nearby wells should be checked.

Structural thinning.—In addition to an actual loss of section by faulting, and an apparent loss by the shaling out of sand sections, structural thinning must be considered when faults are being traced. For instance, on a Southwest Texas structure there will be, say, no closure on the base of the Oakville, 15 or 20 ft. on the top of the Greta, 50 or 60 ft. on the top of the Sinton series, and 200 or 300 ft. on the basal Frio sands. Electric logs of wells on or near the structure will reflect the increase in closure as thinning or absence of formations in the higher wells.

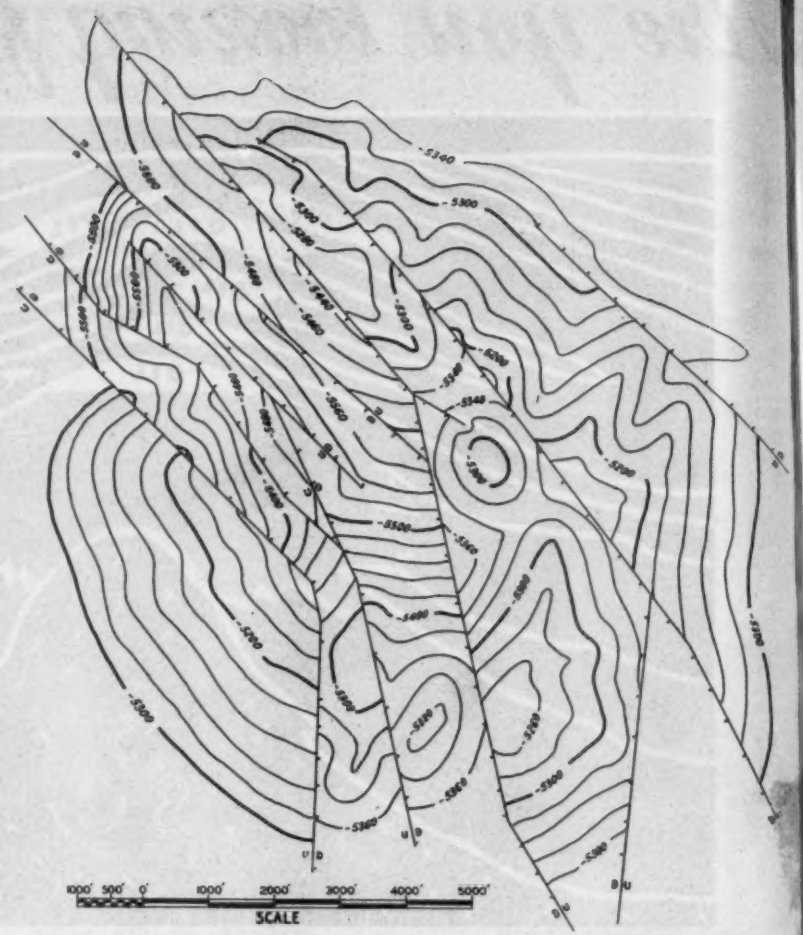


Fig. 2—Complex faulting at South Clara Driscoll field. Twenty-foot contours on a Frio sand.

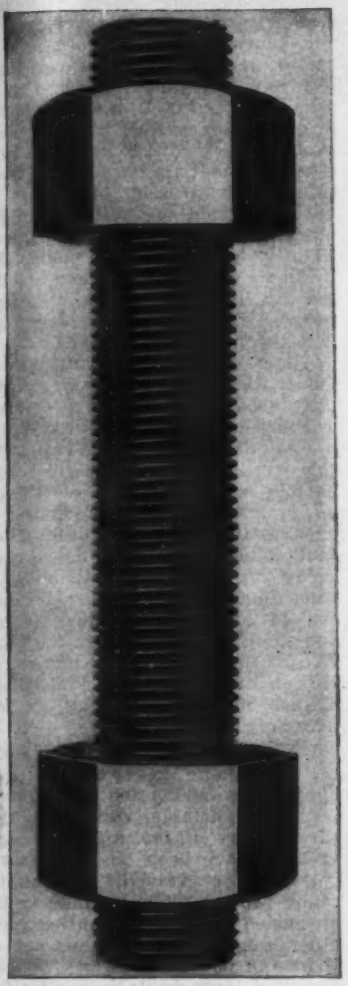
If the formations are varied enough to provide fairly closely spaced distinctive marker beds, the thinning will show as a slight decrease in interval between each bed, and a fault will show as an abrupt loss in section. However, if a well penetrates a long unbroken section of either sand or shale, there may be only one or two correlation points in the entire section. In such wells, a loss in section will not be attributable definitely to either thinning or faulting, because there will be no way of determining whether the loss in section was gradual or abrupt. The addition of the amplified normal resistivity curve to the electric logs has been of great aid in correlating long homogeneous sections.

Thinning is associated with faulting as well as with anticlinal structures. The upthrown wells will almost always have thinner sections than the downthrown ones. In Fig. 1, Well No. 2 has 840 ft. of section between the top of the Greta and the top of the Sinton, while No. 4 has only 790 ft. in the same interval. This is a thinning of 50 ft. in a vertical section of 800 ft. in wells only 1,000 ft. apart.

It will be noticed that most of the thinning was in the upper member of the Greta, and upon first inspection it may appear that the fault had either turned or splintered to cause this short section. However, No. 5 and other upthrown wells show the same section, and since the same fault obviously could not cut all the wells at exactly the same place, there must be some other explanation for the short upthrown section. Two explanations have been offered, and it is probable that either one or both may be correct under proper conditions.

Explanations of thinning.—One explanation is that faulting and deposition were contemporaneous over fairly long periods of time, with the result that the downthrown side was constantly being filled as it sank, that wave and current action tended to maintain a level depositional sea floor, and that hence the sunken or downthrown side would have thicker beds.

A newer explanation has been offered to cover some cases by Sheets.[3] He states that rather than the downthrown side sinking, the upthrown side was raised, and that the move-



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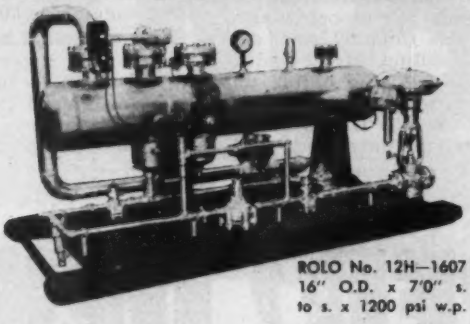

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ment compacted, shook, and rearranged the grains of sand to form thinner but denser beds on the upthrown side. Regardless of how the fault was caused or which explanation is acceptable, the result is the same in that the upthrown beds are thinner.

Self - potential differences. — Less generally characteristic than the upthrown thinning, but probably associated with the thinning and still indicative of faulting, is the reduction of the self-potential of the upthrown sand beds, particularly those near the fault. In Fig. 1, note that in the basal Greta sand member the self-potential in Well No. 4 is 70 mv., and in No. 5 it is 80, while the downthrown beds show about 100 mv. for the same formation. While the reduced self potential could be due to several causes other than nearby movement changing the porosity of the bed, still it may be a clue to possible faulting and should never be disregarded as such in the absence of more tangible evidence of faulting.

Dips of faulted beds.—A fault feature of great importance both in the tracing of faults and in the accumulation of oil and gas is the tendency of the downthrown beds to dip into the fault plane. On down-to-the-coast faults, this feature provides a reversal to the normal regional dip and many traps are formed as a result of it. On up-to-the-coast faults, it results only in an increase in the rate of dip and no trap will be formed unless there is other closure updip. Production is often found between two faults that are parallel and downthrown toward each other. On the upthrown side of faults, there is a tendency for the beds to tilt upward slightly into the fault plane. This tilting is much less pronounced than the dip into the fault on the downthrown side and along many faults it is absent entirely.

Along its strike, a fault may increase, decrease, or remain constant in throw. It may change direction by as much as almost 90°, die out within the distance between well locations, splinter up into smaller faults, or join with another one. There is no practical way of predicting the changes that will take place along a fault, and many dry holes necessarily are drilled in attempting to trace faults. Some of the dry holes can be salvaged by plugging back and sidetracking to get on the proper side of the fault for production, and it is in these operations that detailed studies of fault mechanics are most necessary.

Fault seals.—The sealing effect of the fault plane across the permeable beds that it cuts is another important but unpredictable consideration in the analysis of faulting. Some generalities have been observed, but no rules can be evolved. It seems that sands faulted against shales usually are sealed, while sands faulted against other sands have a somewhat less chance of being sealed. As would be expected, large faults more often form seals than do small ones. Cases have been observed where a short, small fault whose throw was not sufficient to separate the producing sand apparently has formed a seal across its face, only to have migration occur around its ends. These cases become most apparent when studying production and pressure history, and are of special significance when planning pressure maintenance, cycling, or other injection programs.

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1. W. A. Reiter, Contouring Fault Planes, World Oil, July 14, 1947, p. 34.
2. J. W. Low, Subsurface Maps and Illustrations, Chapter 11, p. 902, Subsurface Geologic Methods, Second Edition. Colorado School of Mines.
3. Martin M. Sheets, Diastrophism in Gulf Coastal Plain, Bull. A.A.P.G. Vol. 31, No. 2 (Feb. 1947).

Compact Meeting Set

AUSTIN.—Gov. Allan Shivers has announced that the spring meeting of the Interstate Oil Compact Commission will be held at the La Fonda Hotel in Santa Fe, N. M., April 26-28. Shivers is new chairman of the commission for 1951.

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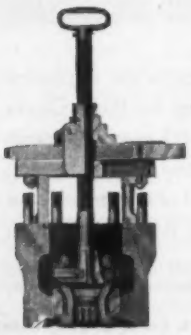

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Digests

ROCKY MOUNTAIN GEOLOGY

Here are digests of most of the papers presented at the first annual meeting of the A.A.P.G. Rocky Mountain Section, held in Denver, March 1-2

Discoveries—Glenrock Area—Converse County, Wyoming

W. H. CURRY, Far West Oil Co., Casper, Wyo.

FIVE wells constitute the discoveries of the Glenrock area, located on the south rim of the Powder River basin, Converse County, Wyoming. Production is obtained from sands in the Cretaceous Muddy and Dakota horizons on three separate structural features. Glenrock field proper is a faulted (?) block east of, and associated with, the large Big Muddy uplift. South Glenrock is producing from a structural nose extending eastward from the east end of Big Muddy. Deer Creek field is a separate feature south of a sharp syncline separating it from Big Muddy, being less than 2 miles from the north front of the northern Laramie Mountains. Production varies from approximately 7,200 ft. at Glenrock through the depths 5,800-5,900 ft. at South Glenrock to 5,100 ft. at Deer Creek. The discovery well for the entire Glenrock area was the Steelco 1 McDonald, completed December 27, 1949, from the Muddy sand.

Slick Creek Field, Big Horn Basin, Wyoming

L. E. HARRIS, General Petroleum Corp., Casper, Wyo.

GENERAL PETROLEUM CORP.'s well 34-32-G, SE SE NE 32-47n-92w, Washakie County, Wyoming, discovery well in Slick Creek field, was completed in the Phosphoria limestone at a total depth of 10,554 ft. on September 27, 1950, for an initial production of 683 bbl. of 33.5°-gravity oil per day flowing through a ¾-in. surface choke. Two stepout wells have since been drilled.

Geology of Beaver Creek Oil And Gas Field, Fremont County, Wyoming

C. C. STITELER, Stanolind Oil & Gas Co., Casper, Wyo.

BEAVER CREEK oil and gas field was discovered in 1938 with completion as a gas well of the No. 1 Johnson from the Lakota sand. The well was shut in until 1944, after which date eight additional gas wells were drilled, producing gas from five Frontier sands, the Muddy, and Lakota sand. Oil was discovered on a test of the Tensleep sand in 1948, at a depth of 10,450 ft. No tests have been drilled to the upper Mississippian or Madison formations, but oil production is believed possible in these deeper beds.

Total closure has not yet been established. Proven productive closure is approximately 1,200 ft.

The Beaver Creek anticline is a gentle fold in the Wind River beds at the surface, the axis trending north-south and having about 100 ft. of structural closure. Subsurface data indicate more sharply folded beds from the Cretaceous through the Triassic, with the structural axis changing direction to trend slightly northwest-southeast.

Below the Triassic, the structure is less pronounced, indicating differential movement through the stratigraphic column from compression stresses. Subsurface and surface data indicate that Beaver Creek and Riverton dome, lying to the northwest, are on the same structural axis.

Geologic Notes on Western Nebraska

GEORGE R. VERONDA, Ohio Oil Co., Casper, Wyo.

STRATIGRAPHIC and structural discussion bearing essentially upon the Cretaceous system in an area of western Nebraska is attempted.

Strata lying between the base of the Tertiary and the top of the Upper Jurassic Morrison formation are described. Suggestive correlations with similar sections in adjoining areas is attempted by means of well logs, electric logs, and limited paleontological studies.

Recent Discoveries of Oil and Gas in Northeastern Colorado

HARRY L. THOMSEN, Shell Oil Co., Denver.

THE discovery of oil in Cheyenne County, Nebraska, by Ohio Oil Co. in 1949, touched off a major land and exploration play on the east flank of the Denver basin. To date, in the Colorado portion of the basin, this play has resulted in the discovery of seven new fields. The history of exploration which led to these discoveries is reviewed and the extent of present development of each field is described.

Discovery of Oil in Tertiary Green River Formation of Uinta Basin, Utah

VERNE E. FARMER, JR., Carter Oil Co., Vernal, Utah.

THE surface occurrence of a variety of hydrocarbons caused the interest of a few independent operators at an early date, but intensive geological and geophysical work by major companies did not begin until after the second World War.

Five wildcat failures between 1946 and 1949 preceded the initial discovery in the Carter-Stanolind 1 Ute Tribal in June 1949. Production from Roosevelt pool is approaching 300,000 bbl.

Oil produced from the Roosevelt pool has a gravity of 32.6° A.P.I. and is extremely paraffinic as indicated by its pour point of 90°. The reservoir consists of fractured oil shale, and has the distinction of being the first large-volume fractured shale production in the Rocky Mountain area.

Sussex Oil Field, Johnson County, Wyoming

W. G. OLSON and RUTH BACHRACH, Continental Oil Co., Casper, Wyo.

SUSSEX oil field, located on the southwest margin on the Powder River basin, Johnson County, Wyoming, is at present in the process of production development. Two unitized areas, and one intervening pool, comprise Sussex oil field which lies in parts of two townships. The first pool discovery was made during 1948 within the Sussex unit. Later development and exploratory drilling have opened up six additional pools.

Sussex field was worked out by the aid of seismograph, gravity, and surface geology. This field is of interest from a geological standpoint because it differs structurally from other fields in the Rocky Mountains. Sussex pools are located on a faulted structural terrace on the northeast margin of the Salt Creek anticline. The terrace is noticeable at the surface by pronounced widening in the Lance formation which crops out over the surface of the field. Normal faulting in low-dip beds is believed to be the major factor in controlling accumulation of oil.

The deepest horizon penetrated to date in the field is the Sundance formation of Jurassic age. Production has been found in the Sussex, Shannon, Frontier, and Lakota sands of Cretaceous age.

Stratigraphic Oil and Gas Possibilities in San Juan Basin, New Mexico and Colorado

CASWELL SILVER, Consultant, Albuquerque, N. M.

LATERAL changes in the lithology of the Cretaceous, Jurassic, Pennsylvanian, and lower Paleozoic rocks indicate conditions favorable for oil and gas occurrence. Cross-sections are shown which illustrate the stratigraphy. Maps are used in locating areas where the stratigraphy is significant.

A major wedge-belt of porosity in the Cretaceous rocks is divisible into an upper part containing large accumulations of gas and a lower part relatively untested. Jurassic rocks have three stratigraphic possibilities for oil and gas. Source beds for oil and gas in the Jurassic rocks may be in the overlying marine Cretaceous rocks, the included Wanakah formation, and the locally truncated and overlapped marine Paleozoic sediments. Meager outcrops and well data suggest repeated overlap relations in beds of Pennsylvanian age. These

marine units contain coarse clastic facies, which were deposited marginal to positive elements on the north and east sides of the basin. Mississippian and Devonian beds which lie locally above the pre-Cambrian show both primary and secondary features favorable to accumulation.

Devonian Correlations in Wyoming-Montana-Alberta-Saskatchewan

L. L. SLOSS and JOHN M. ANDRICHUK, Department of Geology, Northwestern University, Evanston, Ill.

REGIONAL correlations in the Devonian have been obscured by diversity of treatment and the erection of numerous names for local lithologic developments. Broad-scale studies suggest that four operational rock units can be carried over much of the area and that these form a rational basis for analysis of the complex stratigraphic problems involved. The four units recognized are:

1. A basal unit including the "Basal Devonian unit" and "Dc" unit of Montana. Ghost River formation of the Alberta mountain front, and Elk Point and equivalent units in the Alberta-Saskatchewan subsurface.

2. A lower limestone unit including the limestone member of the Jefferson formation, the Fairholme formation (minus uppermost beds), and lithologic equivalents in the subsurface.

3. A dolomite-evaporite unit including the dolomite member of the Jefferson (plus evaporite-breccia zones in the lower part of the Three Forks), the lower part of the Darby formation of Wyoming, the Potlach anhydrite, Morro member of the Palliser and Alexo silt of the Fairholme, and lithologically equivalent subsurface units.

4. An upper post-evaporite unit including the upper part of the Three Forks formation, the upper Darby, the Costigan member of the Palliser, and equivalent clastic and nonclastic beds between the top of the anhydrite and the base of the Exshaw shale in the subsurface.

An attempt is made to refine correlations by tracing of cyclical evaporite deposits, wide-spread clastic zones, and biostromal and fossiliferous-fragmental limestones.

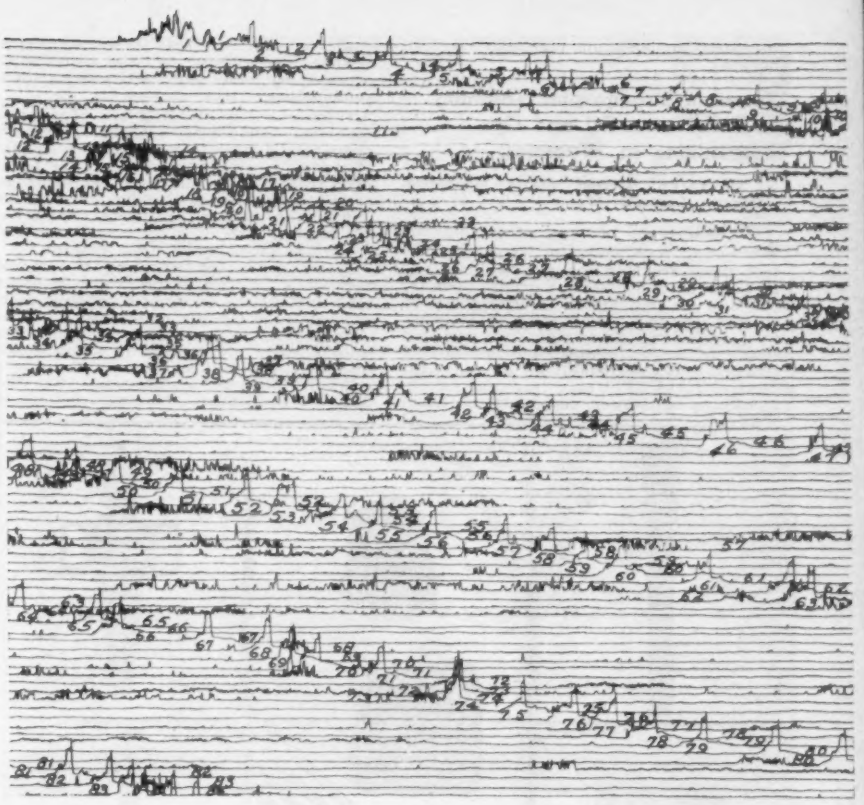
Reefing Limestones of the Hermosa Formation, San Juan Canyon, Utah

SHERMAN A. WENGERD, Department of Geology, University of New Mexico, Albuquerque.

THE Hermosa formation of Pennsylvanian age, exposed in the San Juan Canyon where it transects the Monument upwarp in southeastern Utah, contains several biostromal layers, one of which changes laterally into small bioherms with typical reef-limestone breccia making up the greater part of the deposit.

A bioherm excellently exposed in the San Juan Canyon walls was examined just above river level in 4-42s-18e, between Mendenhall Loop and Honaker Train. At least eight bioherms have been breached by the San Juan River, several of which are exposed on only one canyon wall. The reef limestones are present approximately two-thirds of the Hermosa thickness below the Hermosa-Rico gradational contact, and the fossils suggest that the bioherms are of Des Moines age.

Regionally, the biohermal trends may be controlled by a shelf related to the Paradox-Salt Valley basin in southeastern Utah and southwestern Colorado. Valid predictions as to possible distribution of these reefing limestones must be based on further surface examination, subsurface analysis, and an appraisal of regional controls exerted by the Paradox evaporite basin in relation to



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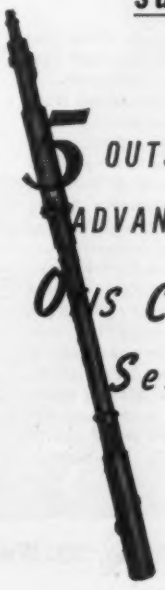

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Zones of Stratigraphic Thinning In Relation to Oil and Gas Possibilities in Wyoming

J. D. LOVE, United States Geological Survey, Laramie, Wyo.

ISOPACH maps of upper Paleozoic and Mesozoic rock units in Wyoming show that there are long zones in which many of these units are thin. Younger zones of thinning are not always superimposed on older zones but most zones trend northwest or north. Each zone may be the result of slight folding and subsequent erosion prior to deposition of the next younger rocks, or it may represent merely nondeposition, slower deposition, or deposition of sediments that differ slightly in volume from those in the surrounding areas. Many zones may be the result of a combination of these factors.

These zones of thinning are of possible economic significance where they are crossed by Laramide folds, for the amount of closure in older rocks beneath the Laramide folds may be materially increased. In areas where the rocks have very gentle monoclinical dips at the surface, some zones of thinning are of such magnitude that there is closure in older rocks at depth.

Zones of thinning developed as early as Pennsylvanian time and as late as Montana time and can be recognized in rock units of most of the intervening epochs. The basic data necessary for construction of adequate isopach maps are lacking in many areas, so not all the outlines of even the major zones of thinning are known. After the zones are located, detailed studies of lithologic changes, porosity, and permeability changes, grain-size changes, and other features of the rocks present on and around the zones of thinning would be necessary to determine the effect of zones of thinning on oil and gas possibilities. Such studies will help determine whether most of the oil and gas has accumulated as a result of Laramide folding or whether some may have accumulated earlier along zones of thinning whose structural expression has been obscured by Laramide folding.

Madison Group (Mississippian) Of Big Horn and Wind River Basins, Wyoming

M. E. DENSON, JR., California Institute of Technology, Pasadena, and NORMAN S. MORRISEY, Stanolind Oil & Gas Co., Tulsa.

STUDIES of both surface and subsurface sections of the Madison group in the Big Horn and Wind River basins, Wyoming, indicate that persistent units can be recognized by means of field data and insoluble residue analysis. From top to base the major units are: (1) beds of unknown age, herein termed "Upper Madison," (2) the Mission Canyon formation, and (3) the Lodgepole formation.

Upper Madison strata occur sporadically over the area; previous work indicates that these beds may be of late Mississippian age. The Mission Canyon formation is subdivided into an upper and a lower member; this formation is relatively uniform in thickness. Regional variations in thickness of the Madison group are confined for the most part to the Lodgepole formation. This formation thins to the south and east and probably is not present in the southern Wind River basin.

Porosity and Permeability of Oil Sands: Age and Depth

KENNETH P. McLAUGHLIN, Department of Geology, University of Montana, Missoula.

POROSITY and permeability data available from the literature have been surveyed to determine as quantitatively as possible the relationships which may exist between these two properties of oil-producing sandstones, their geologic ages, and their present depths of burial. Thorough quantitative analysis of the data was not possible because (1) only ranges of porosity and permeability are available from some references, and (2) many references do not specify as to whether porosity and permeability averages are weighted or are only arithmetic means on thicknesses cored.

The results verify existing belief that the depths from which oil may be produced in the future will be governed primarily by the depths to which sedimentary troughs have been filled and by progress in deep drilling techniques. The data provide some bases for additional speculation concerning the rate of compaction and consolidation of sediments and the relative time of migration and accumulation of petroleum and natural gas.

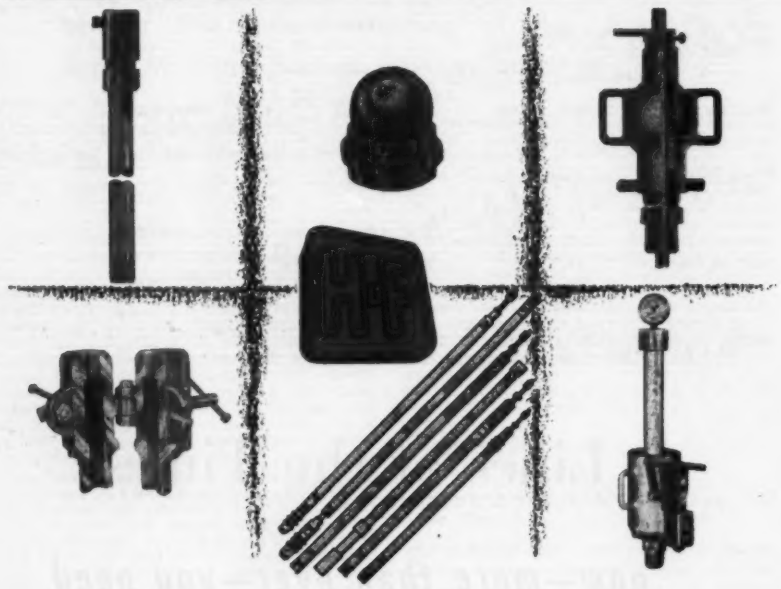
Morrison Formation of the Colorado Plateau Region— A Progress Report

L. C. CRAIG and CLIFFORD N. HOLMES, United States Geological Survey, Craig, Colo.

AN intensive study of the Morrison formation in the Colorado Plateau region is being made by the U. S. Geological Survey on behalf of the Atomic Energy Commission. This report summarizes some of the results of 3 years' work.

In the Colorado Plateau the Morrison formation of Upper Jurassic age may be divided into two parts.

The lower part consists of two gradational intertonguing lithologic members—the Salt Wash sandstone member, present



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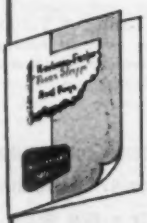

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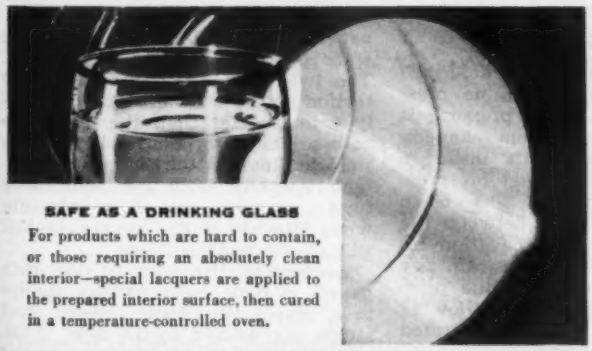

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in southeastern Utah, western Colorado, and extending short distances into Arizona and New Mexico; and the Recapture shale member, present in northwestern New Mexico, northeastern Arizona, and extending a short distance into southeastern Utah. Both members consist predominantly of fluviatile deposits of sandstone and claystone with increasing proportions of sandstone and conglomerate near the main sources. The Salt Wash member was derived from sedimentary rocks, mainly from a southwesterly source, probably in western Arizona. The Recapture member was derived from sedimentary, igneous, and metamorphic rocks, mainly from a southern source, probably in west-central New Mexico. Away from these source areas the members become thinner and contain increasing proportions of claystone and limestone. The Salt Wash sandstone member generally is absent northeast of the crest of the ancestral Uncompahgre uplift and it loses its identity, except in a few places in the Central Colorado basin where discontinuous sandstone beds, considered to be Salt Wash, are present.

The upper part of the Morrison formation likewise consists of two lithologic members —the Brushy basin shale member and the Westwater Canyon sandstone member. The Brushy basin member is present over all the Colorado Plateau except for a belt extending from south-central Utah to central New Mexico, where it its absent, partly as a result of pre-Dakota erosion. The Westwater Canyon member occupies the lower part of the Brushy basin interval in southeastern Utah, northwestern New Mexico, and northeastern Arizona; it is thought to replace the Brushy basin by gradation and intertonguing. The Westwater Canyon consists of fluviatile deposits of sandstone and minor claystone and represents a continuation of deposition similar to that of the lower part of the Morrison. It appears to have the same source and source rocks as the Recapture member. It also is conglomeratic near its source and becomes thinner and nonconglomeratic away from the source area. The Brushy basin shale member is predominantly varicolored claystone with minor lenses of sandstone, conglomerate, and limestone, and consists in large part of fluviatile deposits. However, in lithologic characteristics, it contrasts sharply with the rest of the Morrison. The member may contain beds found in ephemeral lakes or playas, and some of the material may have been contributed by ash falls. Evidence for the source of the Brushy basin member is meager.

Geological History of the Denver Basin

ALEX W. McCOY, III, Gulf Oil Corp., Tulsa.

THE gross sediments of the Denver basin from Cambrian through Cretaceous are discussed. Isopachous and facies maps are presented. From these the tectonic history of the Denver basin is reviewed and its structural development is reconstructed.

Stratigraphy and Structure of Northeastern Strawberry Valley Quadrangle, Utah

HAROLD J. BISSELL, Brigham Young University, Provo, Utah.

THE Northeastern Strawberry Valley quadrangle embraces approximately 240 square miles of the area where the south-central Wasatch Mountains meet the southwestern flank of the Uinta Mountains and form the northwestern boundary of the Uinta basin. This report concerns the stratigraphy and structure of this geologically important region, with an accompanying geologic map depicting for the first time the features on an adequate scale.

An aggregate thickness of 38,000 ft. of sedimentary strata, in age from upper Pennsylvanian through Eocene is exposed within the area. Most of the sediments are marine. A few thousand feet of andesitic volcanics of Oligocene or Miocene age overlies the older strata in a few places. In addition, portions of the area were modified by Pleistocene glaciation.

From the standpoint of structural geology, this area is of great interest for it lies at the locus of the east-west trending Uinta Mountains and the north-south Wasatch Mountains. Geologic mapping proves that overfolded strata of the south-central Wasatch Mountains allochthon were thrust some tens of miles eastward upon the foreland of the flat to gently inclined strata of the southwestern Uinta Mountains. The uparching and ramp thrusting of the Uintas occurred after the east-west thrusting, followed by high-angle normal faulting, uplift, and tilting.

Oil and Gas Exploration in Utah

GEORGE H. HANSEN, Brigham Young University, Provo, Utah.

SINCE 1891 more than 600 wells have been drilled for oil and gas in the State of Utah. Commercial gas or oil has been developed in the Uinta basin, Clay basin, and the Utah corner of the San Juan basin. Potential producing horizons have been discovered in rocks of Mississippian, Pennsylvanian, Permian, Triassic, Cretaceous, and Tertiary ages. Extensive oil land leasing and present drilling commitments promise increased activity for the near future.

Slack in Buried Gas Pipe Lines

(Continued from page 87)

Therefore, the soil restraint required to prevent movement would be:

$$\frac{127{,}000}{5{,}240} = 24.2 \text{ lb. per sq. ft.}$$

From Table 2 it is seen that most of the soils investigated could easily absorb this much stress and are potentially capable of absorbing a great deal more.

Effect of Gas Pressure

The stress measurements described above were obtained with no pressure on the line. When pressure is applied, the stress system changes. Strain-gage measurements made in the test pits indicated that for pressures up to 1,100 psi. the 40 to 50-ft. length of soil covering between the test pit and the main excavation EF (see Fig. 1) was able to restrain any longitudinal movement of the pipe. This restraint allows the following possibilities which can be illustrated by means of examples,

Suppose that a 20-in. line with ⅜-in. wall is operating at 800-psi. gas pressure. If there were no soil restraint and the section were near a valve or other closure, the pipe should elongate about 0.18 ft. in 1,000 ft. This elongation is produced because the pressure on the closure produces an axial tensile stress equal to half the circumferential stress produced by the 800-psi. internal pressure. Since the soil does restrain movement, however, a compression stress of about 5,400 psi. must be developed to provide the restraint required. This would require an average soil restraint of less than 20 lb. per sq. ft.

At sections far from a closure the pipe should contract longitudinally by about 0.24 ft. in 1,000 ft. This contraction is the "Poisson's Ratio" contraction and assumes that soil restraint has effectively eliminated longitudinal tension stresses produced by closed ends. To prevent this motion, a tension stress of about 7,500 psi. must be supplied by the soil. In either case, the stresses from gas pressure would be added to any residual stresses already present. This means that if a residual stress of 18,900-psi. tension is present, a total longitudinal tension stress of 18,900 + 7,500, or 26,400 psi. could be developed.

With good girth welding practice, such a stress should not be of great concern; however, for the purpose of added safety, it might be desirable to reduce the residual tension stresses. This can be done to some extent, at least, by the proper use of slack during line construction. The slack should be designed so that the line has little or no residual stress just prior to backfilling, since once the line has been backfilled there is little chance that slack will be effective in reducing residual stress.

"Package" Pipe Rack

(Continued from page 88)

nested inside the first section. This then forms a cage, or basket into which the rack sections can be placed forming a single package which can easily be hauled on one oil field flatbed truck.

Panels for the pipe rack have structural steel I-beams for top and bottom sills and 4-in. pipe columns. Four panels are built for each side of the walk and are designed to fit in pairs. The two pairs attached to the wide section of the walk are approximately 6 in. shorter than the other two pair so the outer ends will be in a straight line. As the rack panels extend laterally from the walk, they form a complete unit of the structure when attached to the top and bottom sills of the walk sections.

Connecting the ends of the rack panels is done with fittings similar to a simple gate hinge. Heavy steel straps are welded to the side of the sills where pins, or tongues, on the sills of the rack panels are inserted. The outer ends of each pair of panels are connected with "gates" made of pipe as light in weight as practicable so as to reduce the weight of the structure. Simple gate hinges are supplied for these connections so that the connecting frames or gates can be inserted easily between adjacent panels. Each panel is designed so that, when in place, the upper surface of the top sills is level with the planking on the walk sections. Cribbing of one form or another is necessary for leveling the structure, and the type may be selected to fit the soil and anticipated weather conditions.

CHAPTER SIX in the fascinating Story of the Search for Oil

In 1928 The first of the geophysical methods to be used in oil prospecting was that of surveys of variations in the earth's gravitational field by the use of the Eotvos torsion balance. The torsion balance was essentially a modification into a comparatively robust field instrument of the older and more fragile Coulomb balance which had been used in physical laboratories since the 18th century for investigating and demonstrating the laws of gravitational attraction. About 1920, E. DeGolyer, then head of the Amerada-Rycade Oil Companies, became interested in the instrument. In 1922, Donald C. Barton proceeded to Budapest at DeGolyer's instance and acquired two of the balances. The first torsion balance surveys in the United States were made in the Spindletop, Texas salt dome field in early December, 1922, but the first geophysical prospect to be proved in the United States was on the Nash Ranch in Fort Bend County, Texas, where oil was discovered on the flank of a salt dome on January 3, 1926. The use of torsion balance for oil prospecting reached its peak in 1928-29. From E. DeGolyer's book, *"The Development of the Art of Prospecting,"* and from a report by Dr. J. Brian Eby.

In 1951 With the commemoration this year of the 50th Anniversary of the discovery of the Spindletop field, the oil industry has moved into a new era which will demand more petroleum products than any other period in the history of the world. In order to help locate these reserves for the future, General Geophysical now has more crews in the field than at any other period in the history of the company. Working with specialized seismograph equipment . . . developed in General laboratories to meet specific needs for various areas . . . these General Geophysical crews are scattered from Canada to the Gulf Coast. And from the data compiled by these capable crews, geologists and geological departments within the next few years will make the key decision to drill hundreds of wells. For more than 15 years, operators have relied on General's experienced crews to determine and locate conditions favorable to finding new oil reserves. So when you plan to explore new areas and deeper horizons for tomorrow's reserves, let General help you. The percentage for success is in your favor.

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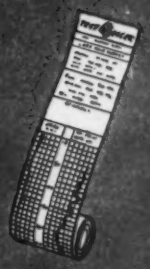

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HOUSTON, TEXAS

Contract-Drilling Prices:

Costs Up 180 Per Cent and More Over 1941 Base

by Roy F. Carlson
West Texas District Editor

THE growth of the drilling-contracting industry in the years since World War II has been extremely rapid, with many new firms being formed and many of the older ones involved in large expansion programs. This expansion was undoubtedly inspired by the earnest need for drilling tools which was occasioned by shortages in producing capacity immediately after the war.

And although this growth was a healthy one there occasionally grow up temporary spots where there may be too many drilling tools in existence. In some such instances the practices of certain people engaged in the drilling industry have led to undue price cutting. Contractors are now drilling a greater percentage of wells than ever before. The expansion mentioned brings so many strings of tools into existence, such as in the Scurry County, Texas, area, that this unhealthy price cutting "spots out." Many contractors in areas where large drilling programs have been going on are faced with the prospect of stacked rigs as completion of development programs approaches. Rather than have rigs idle, these contractors have offered drilling bids that are very close to the breakeven point and which, if a little bad luck in drilling should be encountered, would result in loss to the contractor. At the same time, however, the large number of rigs has required the drilling-contracting industry to achieve a greater drilling efficiency than it has ever known before.

Charts below furnish ample evidence that the situation is getting tighter and tighter so far as the contractor is concerned. This picture is not entirely complete, however, since such things as total footage drilled, equipment improvements, and the kind of drilling contracts are not fully accounted for.

Another complicating factor that makes the contractor's seat a bit hotter is the possibility of tubular-goods shortages, both in rig material and for equipping wells. If enough material is not available to keep the drilling rate high, the contractors will be forced to shut down rigs. This is a situation that confronts operators and contractors alike, however.

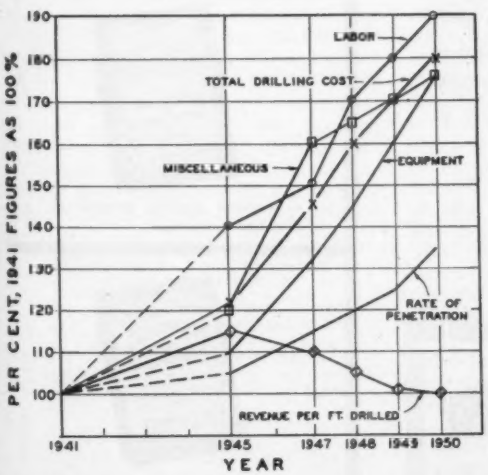
A different situation that eases the position of the contractor a bit is that many of them are also looking for "deals" to drill on their own account to obtain production of their own, in which case the cost of the well is less to the contractor than if contracted to someone else. And while waiting for one of these drilling deals, the contractor can nearly afford to drill for someone else, at little or no profit to himself, if for no other reason than to hold his crews together and keep his equipment in repair.

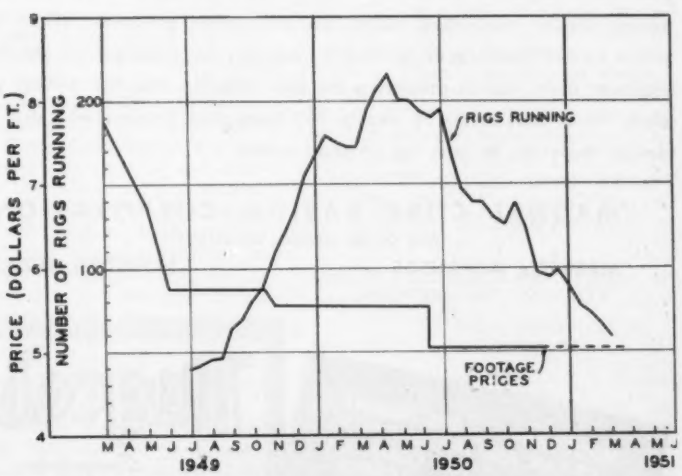
A relationship between price and number of rigs also is charted. The area is Scurry County where the big reef fields are still developing and the drilling prices are those received by a single contractor. Since only one drilling company is represented, these footage rates may vary from the average, but for the most part, particularly after several rigs were active in the field, they show the field-wide price.

The high costs early in the curves are occasioned by the wells being rank or semiwildcats in an area where drilling conditions were virtually unknown. As months pass, and more and more is known about the drilling conditions, the price levels off. Then, as more rigs enter the picture, and as less and less drilling is available, the price falls and toward the end of the drilling campaign—the present condition—price cutting comes into play.

It is rumored that some contracts are in effect for 25 cents below the lowest rate shown on this chart, and it is the consensus that the contractor must have exceptionally good luck at this rate to make any money at all in the drilling program. Incidentally, these contracts are on a straight footage basis to the top of the reef with the operator furnishing mud. Day-work rates are provided while drilling the well into the reef. Day-work rates have been nearly standard throughout at $625 per day with drill pipe in the hole, and $550 without.

Probably the most varied drilling from the contractural standpoint is the deep chert-lost circulation drilling of Pegasus field in Midland County, West Texas. Here there are total-depth drilling contracts, total-depth contracts with chert and lost-circulation day-work clauses, and contracts providing a footage rate to the top of the chert with day-work rates below. The variation is occasioned by operators seeking the most economical kind of contract, modified by competitive bidding among contractors. Rates in Pegasus field have varied from about $11.50 to $10.50 per foot depending on the kind of contract—the lower the footage rate, the more day work is provided for. Operators furnish the mud for drilling and generally assume hole responsibility, regardless of the kind of contract.





Right: Footage prices and rigs running, Scurry County, Texas, area. Left: Revenue per foot and contractor's costs (A.A.O.D.C. data).

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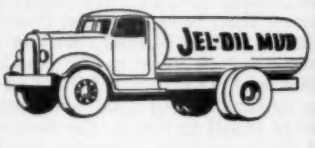

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Characterization Factor and Correlation Index

We have noted that petroleum fractions of the same correlation index have different characterization factors and different average boiling points. What causes this difference? It appears that the correlation index gives a truer indication of the paraffinicity, aromaticity, etc., of a stock than the characterization factor.—J. G. C.

The correlation index is probably the best general indicator of the chemical composition of fractions of hydrocarbon mixtures. Characterization factor is simply the specific gravity (at 60° F.) divided into the cube root of the absolute boiling point (°R), whereas the index is the actual relationship between specific gravity and boiling point described by an equation (see Technical Paper 610—H. M. Smith, U. S. Bureau of Mines, 1940):

$$C.I. = \frac{48{,}640}{K} + 473.7G - 456.8$$

in which K is the absolute boiling point (°K) and G is the specific gravity. The comparative simplicity of the characterization factor, along with the fact that it is older, and the fact that it has been related to many engineering and plant-design properties, probably accounts for the fact that it is widely used whereas the correlation index is seldom seen except in connection with U. S. Bureau of Mines publications. As an indication of the grossness of the characterization factor, Table 1 shows the factors for the paraffin hydrocarbons, all of which have a correlation index of 0, and the factors for mixtures of naphthenes, paraffins, and aromatics, all having a correlation index of 50.

The correlation index is designed in such a manner that any fraction composed exclusively of normal paraffin will always have an index number of zero regardless of the boiling range; that if isoparaffins are present the index number will still be between zero and 12; that as saturated cyclic compounds are added the index number will increase up to a possible maximum of about 50 for the presence of cyclohexanes; and that as unsaturated rings such as the benzene ring are added, the index will increase to 100 for pure benzene, and higher for polycyclics. Thus it is evident that a low index number of 0, 5, or 10 indicates a large proportion of normal paraffins and almost predominantly normal and isoparaffins, that index numbers between this point and 50 indicate increased cyclization, but it cannot be stated exactly whether this is due entirely to naphthenes or possibly to mixtures of a small proportion of aromatics with paraffins. However, the Bureau of Mines has found that indexes up to 50 are usually caused by an increase in cycloalkanes and naphthenes. Indexes above 50 are caused mainly by aromatics.

TABLE 1—COMPARISON OF CHARACTERIZATION FACTOR WITH CORRELATION INDEX

Specific gravity, 60/60	Approximate characterization factors for: Stocks of 0 correlation index	Stocks of 50 correlation index
0.65	12.9	...
0.7	12.7	...
0.75	12.7	11.1+
0.8	13.0	11.1—
0.85	...	11.1+
0.9	...	11.4+

It is readily seen that the correlation index, although qualitative, gives a more complete description of chemical composition than does the characterization factor. It should be noted, however, that the correlation index must be based on the equation shown above—that it cannot be applied to parts or fractions of distillation curves (except true boiling point curves) unless a method is developed for obtaining the true or real boiling point of the fraction from the boiling point (or range) indicated by the distillation curves. The same applies to the characterization factor.

No correction of boiling point is required in a true-boiling-point distillation but all other types of distillation curves require some type of correction. Such a correction was developed by the U. S. Bureau of Mines (Technical Paper 610) for Hempel distillations, and they were thus able to set up tables of the correlation indexes of Hempel fractions in terms of the specific gravities of the fractions. It is the belief of the author of this page that the single correction in boiling point for each fraction that was found by the Bureau of Mines is not adequate but ample experimental data are not now available for stating the true relationship between the vapor temperatures indicated by a Hempel distillation and the true boiling points of the fractions.

There is reason to believe that the temperature recorded in a Hempel distillation for a fraction can be either below or above (as shown in T.P. 610) its real or true boiling point depending on the percentage at which the fraction appears. If such differences exist, they would account for some of the discrepancies between characterization factor and the correlation index.

Regardless of the above, and until adequate experimental data are available, the main reason for the widespread use of the characterization factor is the fact that it is somewhat simpler, it was developed about 7 years earlier than the correlation index, and it has been related to many design and operating factors such as specific heat, heat content, latent heat, critical temperature, critical pressure, molecular weight, viscosity index, the viscosity of blends, aniline point, diesel index, heat of combustion, hydrogen content or carbon-hydrogen ratio, kerosine smoke point, octane number of cracked gasolines, etc.

The Bureau of Mines is interested in developing these same relationships and has of late been including aniline point as a regular test of the Hempel fractions. An enormous number of Hempel analyses have been made, and when relationships between correlation index and the evaluation or design properties are available, the correlation index may be more widely used than the characterization factor. It is hoped that some of these relationships can be explored in another issue of Questions on Technology.

Thus far, the correlation index has been used primarily to estimate the chemical composition of a mixture, whereas the characterization factor has been applied mainly to physical or plant design properties.

Effect of Pressure on Viscosity

Can you direct us to data on the effect of pressure on the viscosity of liquids?—M.G.R.

The effect of pressure is small at ordinary operating pressures, but at 1,000 psi. the effect becomes important and at 50,000 psi. as encountered in bearings, some oils begin to solidify. Dow, Fenske & Morgan studied the effect of pressure before 1937 (Effect of Pressure on Viscosity of Oils and Chlorinated Diphenyls, Ind. Eng. Chem., Vol. 29, p. 1,078, 1937). In April 1921, the magazine Lubrication (The Texas Co.) published the data of Table 1 on the effect of pressure.

TABLE 1—APPROXIMATE EFFECT OF PRESSURE ON VISCOSITY

Pressure psi.	Percentage increase in viscosity: Castor, lard, rape and sperm	Mineral oils
5,000	63- 90	112- 140
10,000	180-230	450- 690
15,000	300-440	*1,300-1,700

*And one sample was increased by more than 6,000 per cent.

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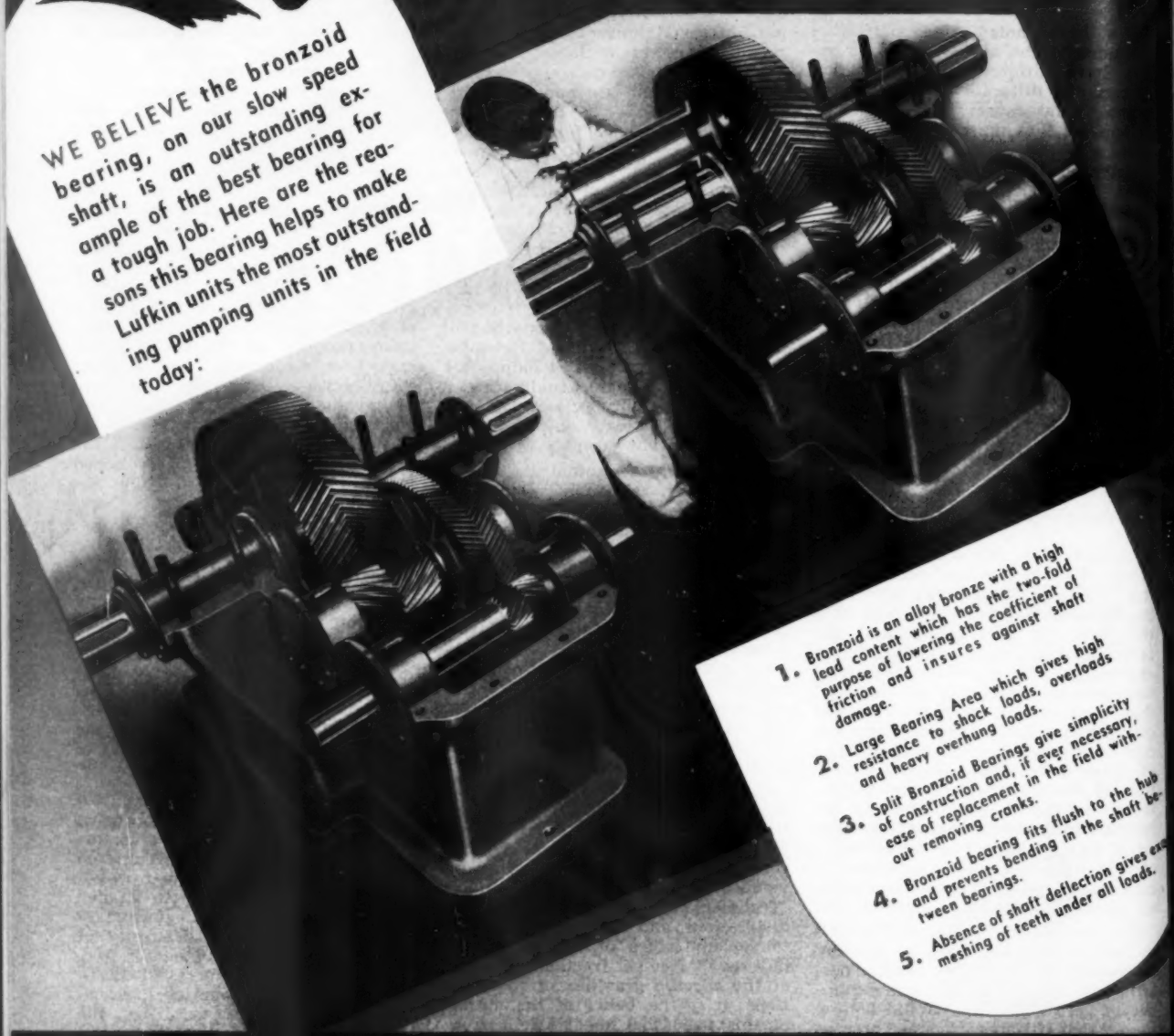

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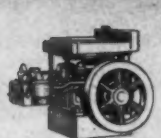

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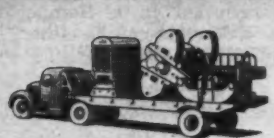

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Graphical Method for Solution of Rate-Time Problems Involving Constant Percentage Decline

SOLUTION of rate-time problems by "semilog" or "constant percentage" decline (Equation 1 of preceding installment) may be made readily by graphical methods. A simple nomograph chart of Equation 1 is presented in Fig. 1.

Three scales are shown on the chart, as follows: The left-hand scale refers to the ratio of the final production rate (or production rate after an elapsed time of n years) to the initial production rate. The diagonal scale refers to the elapsed time in years, n. The right-hand scale refers to the decline rate in per cent per year. Such a chart may be prepared for the entire range of the different variables but, for convenience in reading the chart, Fig. 1 covers a range of most frequent use.

When two of the terms shown on the chart are known, the unknown value is determined by drawing a straight line through the two known values and reading the scale of the unknown value at the point of intersection. An example of the use of the chart is illustrated as follows:

Example.—A lease is producing at the average rate of 50 bbl. per day at an average constant percentage decline of 15 per cent per year. It is desired to know the time required for the production rate to reach 10 bbl. per day at the constant percentage decline rate.

Solution.—The ratio P/P_i is 10/50 or 0.20.

By lining with a straight edge the value of 0.20 on the P/P_i scale and the value of 15 per cent on the decline-rate scale, the diagonal scale, n, is cut at 10 years. Therefore, the time required for the production rate to decline from 50 bbl. per day to 10 bbl. per day, at a constant percentage decline rate of 15 per cent per year, is 10 years.

Fig. 1 of the preceding installment and Fig. 1 herewith may be used for rapid solution of a variety of problems involving constant percentage decline. For example, the oil recovery during the 10-year period in the aforecited problem, can be calculated by obtaining the value of B from Fig. 1 of the preceding installment. The value of B corresponding to 15 per cent per year decline is 2,250 bbl. per barrel of decline in average daily oil production. Total oil recovery over the 10-year period would be:

$$C = B\,(P_i - P) = 2{,}250\,(50 - 10)$$
$$= 90{,}000 \text{ bbl.}$$

These charts can be prepared in convenient size sufficiently accurate for all practical purposes where it is accepted that the constant percentage decline will apply. The latter consideration is of primary importance and it should not be construed that semilog or constant percentage decline can be used indiscriminately in prediction of future production. The expression of recovery by projection of decline curves of any type can be supported only after detailed studies of all available data pertaining to reservoir and operating conditions.

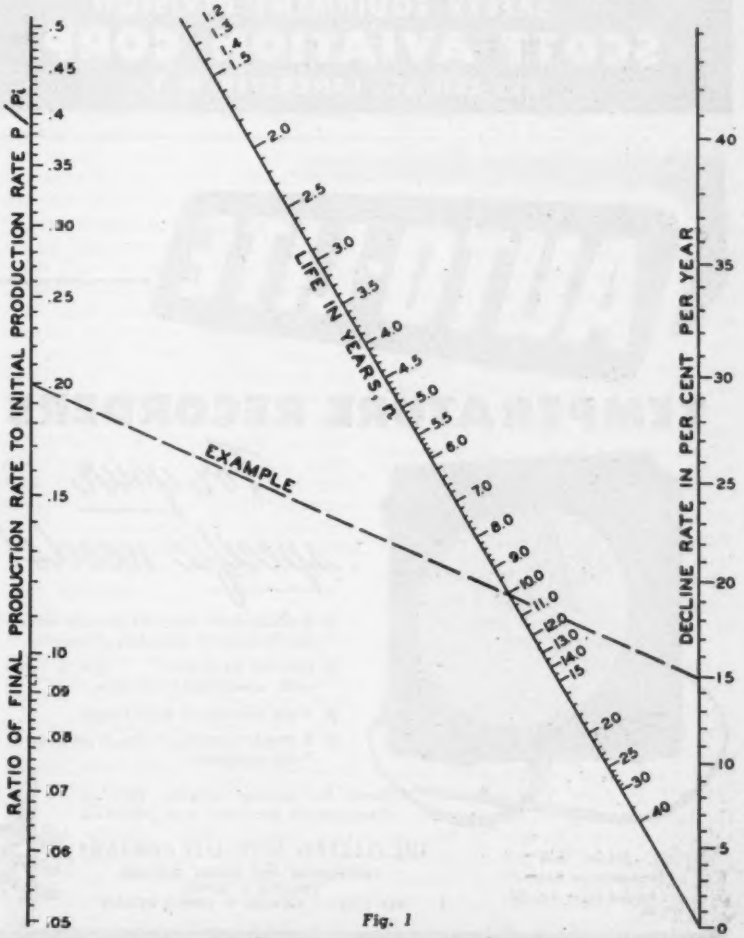

Fig. 1

By Rex W. Woods, consulting petroleum engineer, Tulsa

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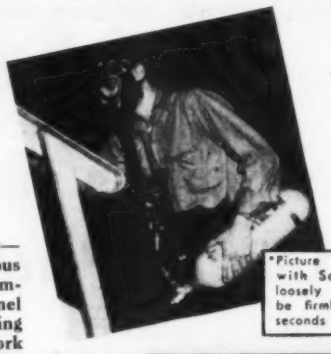
In Toxic Areas



*Picture shows wearer with Scott Sling-Pak loosely carried — can be firmly attached in seconds when in action.

Interested primarily in workers' safety—and not averse to maintaining continuous production as well—the Koppers Company, Inc., equips maintenance personnel with Scott *Air-Pak* Safety Breathing Equipment, for safe, quick repair work in toxic areas. Pictures above and below, taken at the Kobuta, Pa., plant of Koppers Chemical Division, present a typical example of how this is done.* Scott *Air-Pak* supplies cool, fresh *air* (not oxygen) to wearer—can be used safely even in petroleum-vapor areas where use of oxygen is hazardous.

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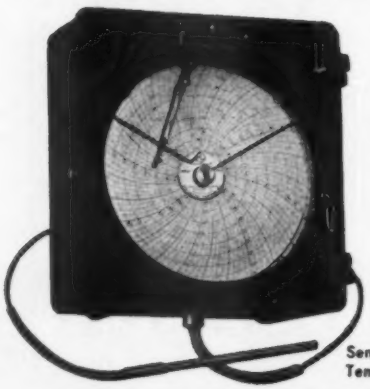

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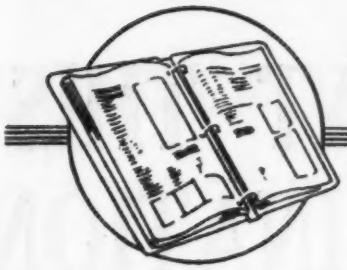

THE REFINER'S notebook

No. 64

Specialized Greases*

SOME of the chief grease characteristics that are obtained with soaps of various types are discussed in this installment of The Refiner's Notebook.

Calcium soap greases.—The chief characteristic of calcium soap or "lime" base greases is their insolubility in water. Calcium greases are smooth and buttery; their soap-lattice fibers are very short. Most calcium greases require a certain amount of water to make the soap-and-oil mixture stable under ordinary conditions—that is, to keep them from separating. Because of this, calcium greases cannot be used continuously at temperatures much above 160° F. since higher temperatures cause loss of this "water of hydration."

Calcium greases are variously classified as cup grease, pressure-gun grease, or heavy-duty lime grease. The better grades are much in demand for economical, general-purpose lubrication of plain bearings in industrial applications where temperatures and loads are moderate.

Sodium soap greases.—The sodium soap used in "soda base" greases is fibrous in texture and relatively water soluble. In general, sodium greases have fairly high melting or dropping points (above 325° F.) which allows them to be used at fairly high temperatures as compared with some other greases.

The length of the fibers in the soap lattice of sodium greases can be varied within wide limits by suitable manufacturing procedures. This permits the manufacture of both smooth and fibrous products adaptable for use under a wide range of conditions.

Short-fiber sodium greases have enjoyed wide popularity as lubricants for ball and roller (the so-called antifriction) bearings. This is particularly true of automotive wheel bearings which, because of the heat generated when the brakes are applied, need a highly heat-stable grease that will not melt and run out onto the brake linings.

Long-fiber sodium greases are frequently employed in lubricating plain bearings and other sliding surfaces that operate at relatively high temperatures (200° F. and above). They are not recommended for high-speed antifriction bearings because the fibers tend to "wrap" around the cages, etc.

Aluminum soap greases.—Perhaps their most outstanding characteristic is great adhesiveness or "tackiness." They are smooth to stringy, but are never fibrous. This is because the aluminum soap fibers are microscopically small—perhaps the shortest fibers of any soap used in grease making. Aluminum greases are not suitable for use at sustained temperatures much above 160° F. In the past they were rather popular as lubricants for automotive vehicle chassis and for cams, chains, and oscillating surfaces where other less-adhesive greases failed to "stay put."

Mixed-base greases.—In the past many greases have been prepared with two or more metallic soaps in combination to produce a lubricant that possesses some of the desirable properties of each of the components. Perhaps the most successful of these combinations are those containing a small percentage of calcium in a sodium grease. Greases using 16 per cent sodium soap and 2 per cent calcium soap, and highly inhibited against oxidation by the use of additives, have achieved considerable popularity for packing the so-called "life sealed" or prelubricated antifriction bearings.

Other soap combinations have been used. Among these are aluminum-sodium, calcium-zinc, lithium-calcium, lithium - calcium - sodium, lithium-sodium, etc. However, most greases employing these soap combinations have been developed for highly specialized applications and many of them are still on an experimental basis.

Less widely used greases.—At various times other metallic soaps than those already mentioned have been used in grease manufacture. Strontium soaps form greases similar to barium greases, but they are more expensive because of the relative scarcity of strontium compounds. Strontium greases are at present being produced commercially in limited quantities.

An especially hard type of grease known as "block" or "brick" grease contains unusually high percentages of soap (30-50 per cent) and usually a high-viscosity oil. Block greases are almost solid, and are used for lubricating plain journal bearings such as those in railroad-locomotive driving journals, calender rolls, cement mills, etc.

Some metallic soaps are incapable of forming the fibrous, lattice-like structure usually associated with a "typical" grease. These soap-oil mixtures are on the border-line between true greases and "fortified" oils, but are usually loosely designated as greases in spite of their fluid character. Of the soaps referred to, lead soaps are perhaps the most commonly used. In fact a lead-soap-oil mixture was introduced nearly a century ago under the name "plumboleum," and this mixture may be said to be the forerunner of the modern lead-soap lubricants that show marked extreme-pressure characteristics. Recent advances in lead-soap grease manufacture have produced stiff-bodied lubricants of relatively high consistency.

Many "fillers" for greases have been introduced at one time or another. One of the most common is graphite, a flake form of carbon, which exhibits qualities of a solid lubricant. Graphite and latex-filled greases are used in extremely rough applications such as on large driving chains. Other fillers including talc and various mineral powders have been introduced for extremely high-temperature applications such as on the hinges of doors on industrial ovens.

Among some of the most recent laboratory experiments with grease-like lubricants are those prepared with "synthetic" oils and organic silicones. Progress along these lines has been hampered by the present high cost of the ingredients. There is a tremendous amount of research being done at present in the field of lubricating greases, and new and different—perhaps revolutionary—grease products may be expected as the result of this intensive study.

*From material prepared by Shell Oil Co. on "Fundamentals of Lubricating Greases."

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OIL AND GAS EQUIPMENT Digest

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TRADE LITERATURE

1 CATERPILLAR PRODUCTS is the title of a new 40-page booklet containing a complete listing with pictures and brief specifications of all but two of the current line of Caterpillar products, 81 in all. Eleven new models were announced during the past year, nine of which are included in this issue. *Caterpillar Tractor Co.*

2 RIGGERS' HAND BOOK shows the latest developments in wire-rope slings and sling fittings. All dimensions are given, as well as working loads under which the slings may be used safely. *Broderick & Bascom Rope Co.*

3 PACKINGS AND JOINTINGS FOR ALL PURPOSES, an extensive catalog, classifies a complete line of packing shapes and materials by the service in which it is expected to perform. In addition to specifications and illustrations of products, the book contains a directory of distributors all over the world. *James Walker & Co., Ltd.*

4 BW COPYFLEX. A new eight-page, three-color booklet describes a machine specifically designed to make direct, positive copies of letters, office forms, or any other typed, written, drawn, or line printed material. *Charles Bruning Co., Inc.*

5 EXPANSION JOINTS. Bulletin EJ-1912, a 16-page illustrated catalog carries dimension, weight, price, and expansion tables on a line of expansion joints ranging from 2 to 24 in. in size, and pressure ratings from 150 to 700 psi. *Yarnall-Waring Co.*

6 FLUID FORGE is the story of Johnston industrial pumps. The six-page multicolor brochure features schematic diagrams and blowups of special construction such as impeller, seal, packing gland, and power adaptability. *Johnston Pump Co.*

7 ORTON WITH GM DYNAFLOW DRIVE describes the combination torque converter and fluid coupling feature, available on rubber-mounted or crawler-type cranes. *Orton Crane & Shovel Co.*

8 TYPE A PRESSURE-CONTROLLED FLOW VALVE is a catalog sheet, perforated for loose-leaf binding. A cutaway engineers' drawing in color, points out features and operation of the unit. *The Guiberson Corp.*

9 DETECTRON 505 PIPE DETECTOR. Application of the instrument in determining the exact location of buried or hidden pipes, valves, cables, or other metallic objects is covered in this two-color folder. *The Detectron Co.*

10 SCRAPER STRAINERS is a catalog sheet describing the type SRS and the type VRS scraper strainers. In both cases the screen is fitted with a rotary scraper to keep clogged screens clean. Pipe sizes range from ¾ to 8 in. *Sarco Co., Inc.*

11 VELAN STEAM TRAP ASSEMBLY. Cutaway illustrations pro-

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vide a step-by-step description of the trap's operation. Pressure ratings, orifice, and weight are given for each type. This single trap performs the same service as the combination strainer, air vent, float trap, sight glass, and check valve. *Velan Engineering Co.*

12 MODERN MOTOR AND DIESEL ENGINE OILS covers the analysis of 10 basic oils, carefully selected from every lubricating crude-oil source. These oils are available in regular, premium, heavy-duty, or super-duty types. *Commerce Oil Corp.*

13 STEAM-VALVE AND BUTTERFLY-VALVE SIZING CHARTS. A steam-valve sizing chart covers the range from 1 to 1,000,000 lb. per hour, and a butterfly-valve sizing chart covers the range of 15 to 10,000 g.p.m. *Fischer & Porter Co.*

14 REX AND BALDWIN REX OIL-FIELD CHAINS. A detailed presentation of the Baldwin Rex BA riveted oil-field assembly is given in Bulletin 51-8. Also included is a description of Rex oil-field chains, including Rex offset side-bar roller chains and Rex A.P.I. chains. *Chain Belt Co.*

15 FLEETFONE STATION EQUIPMENT is a 16-page, illustrated booklet describing the Type CT-10A, 70-watt and the Type CT-11A, 250-watt Fleetfone transmitters and the companion Type CR-15A receiver, designed for use in the 30-50-megacycle frequency band by public-utility and transportation services. *R.C.A.*

16 TELEMETERING. A new folder, DMO 29, on telemetering contains information and illustrations on the use of Metameter telemeter for remote measurement and automatic control of variables over distances ranging from a few feet to many miles. *The Bristol Co.*

17 HYDRAULIC PULLERS AND JACKS. Labor-saving applications of hydraulic pullers and jacks are described in a new eight-page bulletin, Hydraulic 51. It also introduces Simplex Re-Mo-Trol hydraulic pumps and remote-controlled rams, with illustrations. *Templeton, Kenly & Co.*

18 INTEGRAL ONE-PIECE FINTUBES is a new eight-page Bulletin 511, describing construction of integral extended surface fintubes. It lists the range of sizes and materials available, and also illustrates the wide variety of heating and cooling applications used, including engineering data. *Brown Fintube Co.*

19 LK-FIN COOLER. Bulletin 1020 describes a new design of oil and water cooler which is distinguished by the use of helically finned heat-transfer elements in place of conventional bare tubes. *The Griscom-Russell Co.*

20 INSERT PUMPS. Two four-page, illustrated folders, each describing operating and other technical data on three newly designed insert pumps for deep-well production, contain engineering details, sizes, and other pertinent information. *Harbison-Fischer Manufacturing Co.*

21 NAYLOR THREADED SURFACE CASING is a new illustrated bulletin on threaded surface casing covering structural and performance data as well as complete specifications in concise form. *Mid-Continent Supply Co.*

22 ZEOLITE SOFTENERS. Publication 4520 gives a detailed explanation of the sodium zeolite softening process; data necessary for laying out a zeolite water softening plant; factors governing the sizing of such equipment, and selection of zeolite material. *Cochrane Corp.*

23 WELDED STEEL PIPE. A new 32-page Bulletin 370 covers Spang CW steel pipe and manufacture, and includes black and galvanized pipe in all standard sizes from ⅛ to 4 in., with tables of dimensions, weights, test pressures, threading data, and bundling schedules. *Spang-Chalfant Division, National Supply Co.*

24 M.S.A. FACESHIELDS. New line of faceshields, offering greater user economy through a choice of specific visors for specific types of hazards is described in Bulletin CN-4. *Mine Safety Appliances Co.*

25 NEW DIESEL ENGINES. An 18-page Bulletin S-500-B52A describes and pictures the four-cycle, direct-injection, totally enclosed engines with photographs, cutaway line drawings, and specifications. *Worthington Pump & Machinery Corp.*

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by Dan B. Miller

26 TD INSERT-TYPE SLIPS are for use with the Advance air-powered tubing spider. The gripping edge of the insert is circular and is contoured to conform to the curve of the tubing, thus holding the tubing against rotation as well as suspending it vertically. With this type of slip the tubing can be backed up throughout the full string down to the pump. Each slip segment holds six individual inserts which may be quickly replaced when worn, at a very nominal cost. A set of TD slips will support a load of 250,000 lb. *Advance Oil Tool Co.*

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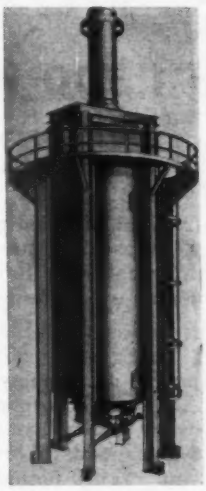

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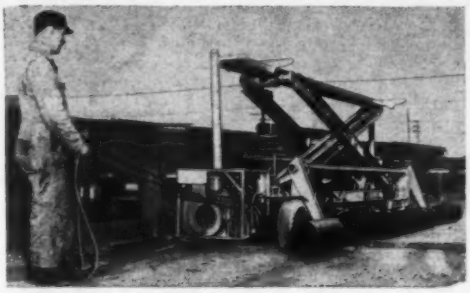

of control cords attached to a four-way valve on the loader. The operator can stand up to 25 ft. away while operating the machine in safety. Machine can load from the ground, a truck, or a storage pile to a gondola, truck, or storage pile. The straight-lift pipe loader is a mobile unit, self-propelled, but also designed to be towed. *The Republic Supply Co. of California.*

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29 SMALL, LONG-STROKE HYDRAULIC PUMPING JACK. Having a 10-ft. surface stroke and a 20,000-lb. polished-rod load rating, this new small series "D" hydraulic pumping jack retains all of Pelton's exclusive features including triple-screw, positive-displacement pump and full hydraulic reversing controls for either skid-mounted or casing-head installations. *Pelton Water Wheel Co.*

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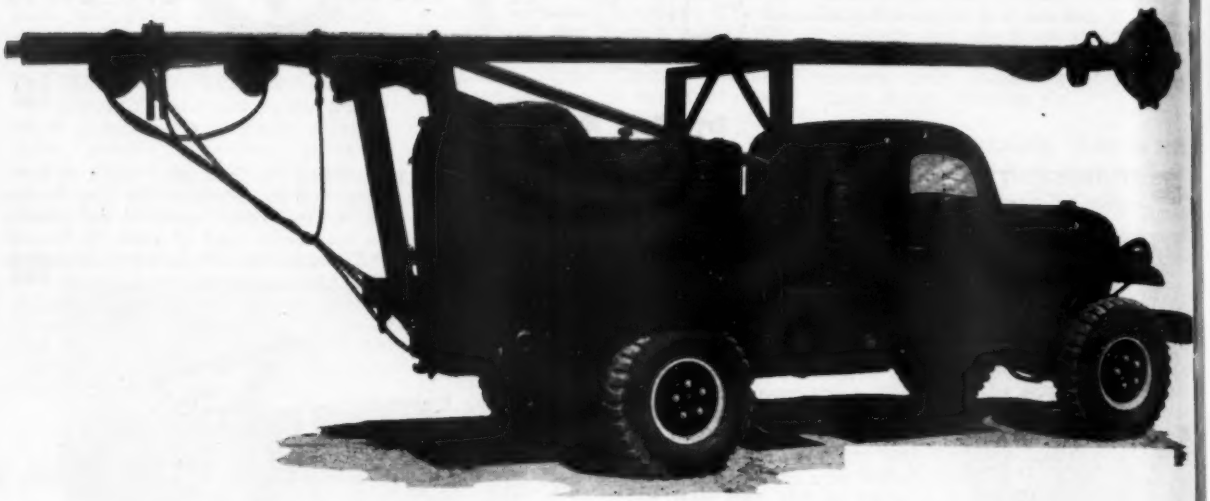

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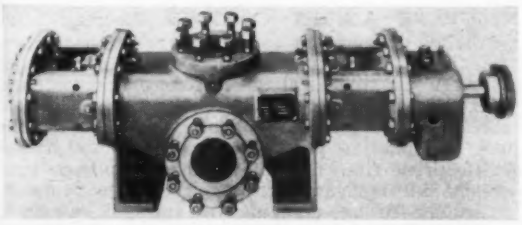
30 DELUXE FILTER NO. 315000. Filter consisting of eight cartridges, a large nonagitated sump to promote settling of heavy particles, an oil reservoir, and a mechanism compartment, is capable of removing the contaminates from used oil. The filter will remove solids, dilution, moisture, asphaltenes, and acids but will not remove additives. Oil reservoir is equipped with two Calrod heat units which are controlled by a thermostat and a heater switch. Thermostat is set at 180° F. A four-station valve operates to transfer oil from one container to another; to deliver dirty oil from container to reservoir; to deliver oil from reservoir to filter and return free flow to the reservoir; and to discharge oil from reservoir to container. *De Luxe Products Corp.*

IT'S NEW CHECK IT

31 KAYLO HEAT INSULATION. The range covers tubes and pipes from ¼-in. diameter to 72-in. and vessels up to 60 ft. This helps the user to reduce cutting and fitting during application. Heat insulation, made of hydrous calcium silicate which insulates effectively up to 1 200° F., is made in all standard sizes of block and in thicknesses from 1 to 6 in. for flat-surface insulation. As preformed pipe covering, it is made in sectional form for all standard tube or pipe diameters from ¼ to 12-in.; tri-segmented for pipes and tubes up to 41 in. K-segmental (curved pieces 18 in. wide) for pipes and tubes up to 72 in.; and curved block nominally 18 in. wide for large vessels up to 60 ft. in diameter. For diameters larger than 60 ft., flat block is used. *Owens-Illinois Glass Co.*

IT'S NEW CHECK IT

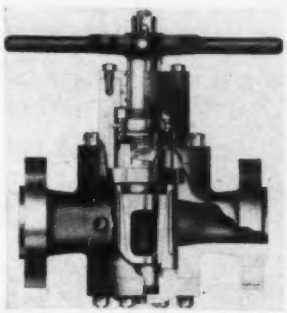
32 BRACKET-TYPE SCREW PUMP. A new external gear-and-bearing bracket-type screw pump for positive displacement of nonlubricating liquids of all viscosities at 1 to 700 g.p.m. has single-point alignment, "dual controlled" rotors, and other new features providing greater durability, easier installation, and faster servicing. External timing gears and all bearings are in



housings, which form an integral unit with the pump body. For less wear on bearings and timing gears, rotors are positioned axially as well as radially. Axial control is provided by new thrust bearings—in the form of double-row angular contact ball bearings, at the outboard end. Radial control is provided by precision-cut timing gears, and newly added heavy-duty roller bearings. *Sier-Bath Gear & Pump Co., Inc.*

IT'S NEW CHECK IT

33 GENERAL TWIN SEAL VALVE. Advantages include: no lubrication required, which eliminates daily maintenance; ease of operation at all temperatures from normal room temperatures to subzero; one and a quarter turns operate from full open to full closed; valve seats retract before rotation of plug, thus assuring free rotation and elimination of wear, scoring, galling, or sticking. Individual seats expand against body ports in closed position giving positive, vapor-tight shutoff. Seat inserts are easily replaceable through bottom plate of valve without disassembly. Supplied in flanged or screwed end in sizes from 2 to 8 in. for cold working pressures from 230 to 2,000 psi. Sizes 2 to 4-in. also available for cold working pressures of 3,000 and 5,000 psi. *Kerotest Manufacturing Co.*



IT'S NEW CHECK IT

34 ONE-MAN MOBILE WORK TOWER. Controlled by a foot-operated lever on the platform, this new electrohydraulic work tower is quickly raised to permit reaching equipment or ceilings as high as 22-23 ft. The telescoping tower is easily rolled anywhere and locked in the working position. Work platform is elevated through extension of a hydraulic ram, with the hydraulic pump operated by a battery-powered electric motor. Any standard 6-volt automotive storage battery may be employed. Pressing the foot lever in one direction elevates the platform, turning it in the opposite direction will release the hydraulic pressure to lower the platform. *Safway Steel Products, Inc.*

IT'S NEW CHECK IT

35 PLATE-EDGE PREPARATION DEVICE has been designed to increase production and insure cleancut, accurate preparation of plate edges. Its ability to cut a single or double bevel accurately, with or without a land, recommends it for use in shops doing steel fabri-

cation work. The device which employs a spring-balanced, free-floating carriage and caster-wheel assembly to permit bevel cutting over plate undulations while maintaining a constant tip-to-work distance, may be mounted on any gas cutting machine equipped with a 3-in. square torch bar. Torches may be individually positioned vertically or laterally without changing the bevel angle. Fuel and preheat pressures are initially set with individual torch valves, and once set, the master valve controls turning-on and shutting-off gas supply without disturbing settings of the individual torch valves. *Airco Co. International.*

IT'S NEW CHECK IT

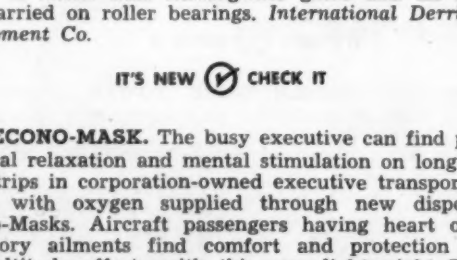
36 F-12-DA114 PUMPING UNIT. This unit has polished-rod load capacity of 11,600 lb. and it is fitted with a double-reduction herringbone-geared speed reducer with an A.P.I. peak torque capacity of 114,000 in.-lb. Wheel-type counterbalanced crank has a maximum stroke of 54 in. It features a rigid four-leg samson post, a new rigid welded subbase under the speed reducer, and a shockproof pitman equalizer assembly. The speed reducer is fitted with herringbone gears and all shafts are carried on roller bearings. *International Derrick & Equipment Co.*

IT'S NEW CHECK IT

37 ECONO-MASK. The busy executive can find physical relaxation and mental stimulation on long business trips in corporation-owned executive transport aircraft, with oxygen supplied through new disposable Econo-Masks. Aircraft passengers having heart or respiratory ailments find comfort and protection from high-altitude effects with this new lightweight Econo-Mask, used in conjunction with constant-flow oxygen systems. Low unit cost permits disposal after one use on public carriers. Rugged pliofilm and paper construction allows several uses by passengers in private service. *Scott Aviation Corp.*

IT'S NEW CHECK IT

38 NEW IDEAL TYPE E-500 POWER SLUSH PUMP with 7¾-in. maximum fluid cylinder liner bore, 14-in. stroke, and rated at 500 hydraulic horsepower output at 70 s.p.m., incorporates a fabricated power end similar to that used on the type E-700 pump. This type of construction produces a pump with a relatively low weight per horsepower factor. Weight is approximately 38,000 lb. Pump frame is of unitized construction. It combines steel plate and steel castings welded into one unit. The fluid end is a one-piece steel casting without internal baffles or walls. Pump utilizes a splash system of lubrication for the main gear, pinion, and crossheads. Oil from the meshing of the main gear and pinion is caught in a trough and cascaded over the crossheads to provide lubrication for the crosshead bearings and guides, and is returned to the sump. *The National Supply Co.*



IT'S NEW CHECK IT

39 RUBBER-LINED VALVE. Developed for emergency gas or liquid shutoff service, heavy-duty cast-iron valve No. 763 is rubber seated. With the angular seating vane for wedge-type closure, the rubber is compressed around the periphery of the vane to give positive shutoff even around the shaft bosses. This type of construction makes it possible to use an iron body valve in service that would normally call for stainless steel or other alloy. The rubber flanges take the place of the usual flange gaskets. It is completely cycled and operated by a directly connected motor-driven pump. Hydraulic pressure raises the counterweight for the open position. When the valve is fully open, operating motor is cut off by integral switch. Should current fail, the oil operator is released, the counterweight drops, and the valve is closed. Valve action can be reversed. Sizes from 2 to 72 in. *R-S Products Corp.*

IT'S NEW CHECK IT

40 NEW AUTOMATIC HIDDEN ARC SEAM WELDER has a wide range of application and does not tie capital investment to one particular welding job. The machine is a standard seam welder for automatically welding seams in metal ranging from 14 gage to ¼-in., and is designed for welding cylinders or other hollow shapes. It can also be used to splice sheets and through weld flanges in making containers. Work up to 18 ft. long can be handled and the machine can be extended to take longer pieces. Minimum diameter is 12 in. *Lincoln Electric Co.*

IT'S NEW CHECK IT

41 NEOPRENE AIRDRY COATING. Neoprene, the synthetic rubber made by du Pont, can now be applied as an airdry protective coating for industrial maintenance work on structural steel, concrete, wood, and exterior surfaces of tanks and equipment. It is applied by brush or spray gun in a single coat of 5 to 10 mils thickness. Outstanding properties are those which distinguish neoprene from natural and other synthetic rubber—exceptional resistance to oil, grease and chemicals; resistance to age-cracking by sunlight, weather, and ozone. It also possesses the characteristic properties of any rubber product—resilience, elasticity, high order of abrasion resistance, nonchipping and noncracking. *Gates Engineering Co.*

PIPE LINES

Florida Gas Line Proposed

WASHINGTON. — South Atlantic Pipe-Lines, Inc., of Jacksonville, has filed with the Federal Power Commission an application for authority to build a 254-mile natural-gas-transmission line in Florida from the Jacksonville area to St. Petersburg.

South Atlantic's program also includes the building of about 50 miles of laterals and a compressor station. Cost of the project is estimated at $23,500,000.

The main line would connect with other natural-gas-transmission lines in the Jacksonville vicinity and extend southerly to Green Cove Springs, Palatka, Deland, Sanford, Winter Park, Orlando, Kissimee, and Haines City. The line would run west from Haines City to Lake Alfred, Lakeland, Plant City, Tampa, Booths Point, Dunedin, Clearwater, Largo, Pinellas Park, Gulfport, and St. Petersburg. A lateral line would be built from Lakeland south to Nichols, Mulberry, Pierce, Brewster, Agricola, and Pembroke.

The company said preliminary studies indicate a potential firm load of approximately 115,000,000 cu. ft. per day and an interruptible load of approximately 140,000,000 cu. ft. per day in the fifth year of operation.

Gas Line Nears Completion

CORPUS CHRISTI.—Construction is expected to be completed this week on a 68-mile gas pipe line between Central Power & Light Co.'s new $45,000,000 plant at Laredo, Tex., and Lopena field, Zapata County.

The 8-in. line is being built by Altgelt Construction Co., of Corpus Christi, for Delhi Gas Pipe Line Co. at a cost of approximately $1,000,000. Initial capacity will be 5 to 8 million cubic feet of gas daily, and the new electric power plant will be sole user of the gas.

The line will be tested for several days, and delivery of gas is expected to begin April 1. The new power plant is due to go into operation shortly thereafter.

Service Buys Humble Lines

Purchase by Service Pipe Line Co. of a gathering and trunk-line system between Albany and Ranger, Tex., from Humble Pipe Line Co., has been announced by J. L. Burke, Service president.

Burke said the ownership transfer of the system, which serves 320 leases and 1,633 wells with a daily allowable of about 10,000 bbl. of oil, will be made April 1 without interruption of service to producers and shippers. Consideration for the transfer was not revealed.

The West-Central Texas production served by the Albany system is located mostly in Shackelford and Throckmorton counties. A few of the 320 leases are in the southeastern corner of Haskell and northwest corner of Stephens counties. The system includes about 300 miles of 2 to 8-in. line, several working tanks, pumping units, and miscellaneous operating equipment and buildings.

Last January, Service purchased 48 miles of 8-in. line between Ranger and Weatherford, Tex. This line has been connected to the company's north-south trunk line near Weatherford, almost doubling previous capacity from the Ranger area.

Michigan Lines Asked

WASHINGTON.—Plans for construction of approximately 77 miles of natural-gas lines in South-Central Michigan have been laid before the Federal Power Commission for approval by National Utilities Co. of Michigan, Coldwater, Mich.

The company also asks FPC to direct Panhandle Eastern Pipe Line Co., of Kansas City, Mo., to connect its pipe-line system with the proposed facilities and sell gas to the Michigan firm.

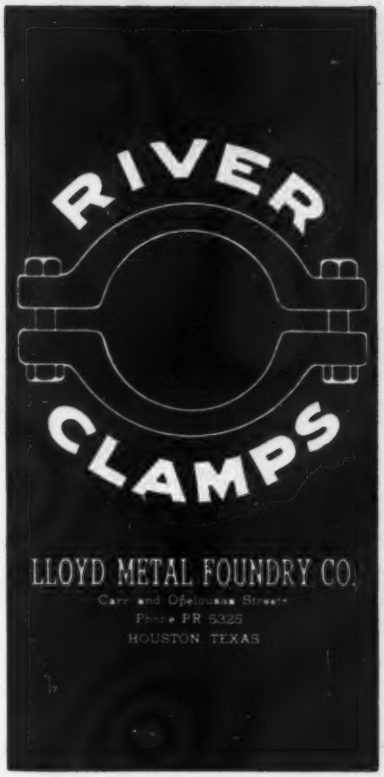
National Utilities proposes to build a 22.7-mile line from a connection with Panhandle's system near Marshall to Coldwater. From Coldwater, a 20-mile line would be built to Hillsdale and a 22.5-mile line to Sturgis. In addition, a 5-mile line would run from Hillsdale to Jonesville and a 6.5-mile line from a point midway on the Marshall-Coldwater line to Union City.

The proposed system would cost an estimated $1,500,000 and would have a daily capacity of about 11,000,000 cu. ft.

Illinois Work Resumed

CARLYLE, Ill.—Midwestern Constructors, Inc., of Tulsa, has started work here on the Illinois leg of the Gulf Coast-Joliet, Ill., natural-gas line being built for Texas-Illinois Natural Gas Pipeline Co.

Work which began at Grand Tower in September last year was shut down in the vicinity of DuQuoin, Ill., for the winter after about 27 miles of the $20,000,000 section of line had been completed. Mud prevented resuming work near DuQuoin so operations were shifted to Carlyle. About 290



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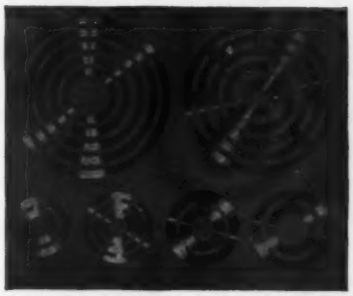

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miles remain to be laid on the Illinois section.

The entire line has been estimated to cost about $175,000,000.

Loop-Line Approval Sought

WASHINGTON.—United Gas Pipe Co., of Shreveport, plans to construct approximately 50 miles of gas lines in southeastern Alabama and northwestern Florida, pending Federal Power Commission approval.

The proposed project, estimated to cost $1,945,000, would include about 39 miles of 16-in. loop line paralleling United's existing Pensacola lateral from a point in Baldwin County, Alabama, to a point in Escambia County, Florida. Two laterals 5.8 and 5 miles long, would also be constructed.

Among the markets served by the lines would be the Naval Air Station at Saufley Field and Elgin Air Force Base.

The proposed construction would bring the total capacity of United's Pensacola system up to about 75,700,000 cu. ft. per day.

39-Mile Line Planned

WASHINGTON.—New York State Natural Gas Corp., New York City, has filed with the Federal Power Commission for approval of a planned 39-mile, 20-in. natural-gas line in Pennsylvania and New York.

The line, estimated to cost $2,093,700, would extend from the company's state-line compressor station in Potter County, Pennsylvania, to the border of Livingston and Monroe counties, New York. It would parallel an existing line that extends to the Rochester area. New York State Natural said the line would enable it to meet increased needs of consumers.

Pipe-Line Briefs

Interstate Oil Pipe Line Co. is surveying right-of-way for a 4-in. gathering line to connect four Wilcox fields in Adams County, Mississippi. The line, reported to be about 13 miles long, will connect Kingston, Sibley, Overton, and New Era fields. It will terminate in La Grange field and tie into Interstate's main line.

Houston Contracting Co., in cooperation with Industrial X-Ray Engineers, conducted a short course recently on X-ray interpretation of pipe-lined welding at the company's Houston warehouse. The course consisted of lectures and inspection covering all standards of pipe-line welding activity.

Frontier Pipe Line Corp. is buying right-of-way and making a survey for a 6-in. crude line from McAllen, Tex., to the Taylor Refining Co. plant near Port Isabel in South Texas. Construction is scheduled to begin this month.

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Fewer Holidays. Uniform porosity gives even bleed-through of coating compound, allows holiday-forming gases to escape.

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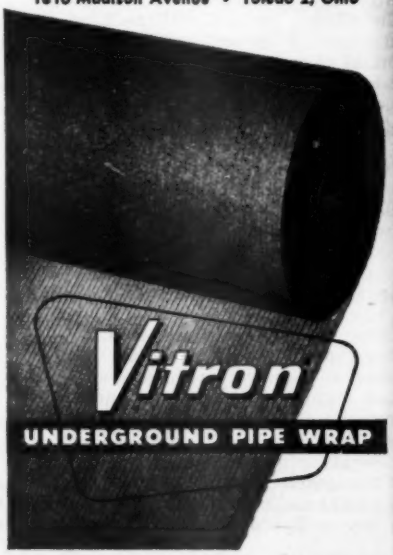

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. The list was compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Phillips Pipe Line Co.—35 miles, 10-in.; authorized; Brownfield, Tex., to Plains, Tex.

Phillips Petroleum Co.—278 miles, 10-in., under way, Borger, Tex., to Yale, Okla.; Brown-Lite Co., Tulsa, and Arey-Phillips Construction Co., Pampa, Tex., contractors.

Phillips Pipe Line Co.—53 miles, 8-6-in., under way, Wheeler to Sweeny, Tex.; O. R. Burden Construction Co.

Phillips Pipe Line Co.—24 miles, 8-in., under way, Thrall to Kansas City, Kans.; C. H. Gragg Construction Co.

Platte Pipe Line Co.—1,075 miles, 16-20-in., contracted, Worland, Wyo., to Wood River refining area in Illinois. Contracted as follows: 552 miles, Chatham, Wyo., to Holdredge, Neb., R. H. Fulton & Co., (Sections 1, 2, 3, and 4—section 1, 126 mi., of 16-in.—remainder 20-in.); 142 miles, 20-in., near Marysville, Kans., to Holdredge, Nebr., Bishop & Lock. H. LaQuey, spreadman, (Section 5); to begin May 1951; 100 miles 20-in., northern edge of Kansas, Rumsey Brothers, (Section 6); 274 miles, 20-in., State of Missouri, O. R. Burden, (Sections 7 and 8).

Sinclair Pipe Line Co.—700 miles, 22-in., planned; Drumright, Okla., to Chicago.

Texas Pipe Line Co.—56 miles, 12¾-in., Chico to Wichita Falls, Tex.; R. H. Fulton & Co., contractor; M. L. Boyd, spreadman, Henrietta, Tex.

West Coast Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas to California.

West Texas Gulf Pipe Line Corp.—450 miles 24 and 26-in., authorized, West Texas to Gulf Coast.

Products Pipe Lines

Buckeye Pipe Line Co.—400 miles, 8 to 14-in., under way, New York, New Jersey, Philadelphia.

Great Lakes Pipe Line Co.—355 miles, 12-in., authorized, Kansas City through Omaha and Sioux City Iowa, to Sioux Falls, S. D.

Great Lakes Pipe Line Co.—119 miles, 8-in.; planned; Des Moines to Iowa City.

Miami-Valley Corps.—58 miles, 8-in., under way, Dayton to Cincinnati, Ohio; Anderson Brothers Co.

Plantation Pipe Line Co.—707 miles, 14 and 18-in., contracted, Baton Rouge to Charlotte, N. C., 275 miles, 14-in., under way, Bremen to Charlotte, N. C.; 432 miles, 18-in., under way, Baton Rouge to Bremen, Ga.; 220 miles, 18-in., Baton Rouge to Mississippi-Alabama state line; Williams Brothers Co. Baton Rouge, David R. Williams, Jr., project manager, George Allen, general superintendent, O. L. Martin, spread superintendent, Tuscaloosa, Ala.; T. E. Davis, spread superintendent, Talledega, Ala.

Pure Transportation Co.—100 miles, 6-in., under way, Heath to Dayton, Ohio; Wabash Construction Co.

Standard Oil Co. (Ind.).—50 miles, 8-in., under way, north of Sugar Creek, Mo., refinery; Lawhon Construction Co., Southern Mill & Mfg. Co., contractors.

Standard Oil Co. (Ind.).—144 miles, 8-in., authorized, Neodesha, Kans., to Sugar Creek, Mo.

Texas Pipe Line Co.—56 miles, 10 in., under way, Lawrenceville, Ill., to Mt. Vernon, Ind.; O. R. Burden Construction Corp., contractor; O. P. Hines, spreadman; Mt. Carmel, Ill., field office.

Triangle Pipe Line Co.—100 miles, 10-in., planned, Eldorado, Ark., to point on Mississippi River.

Tuscarora Oil Co., Ltd.—27 miles, 8-in., contracted, Pittsburgh Junction, Pa.; to Midland, Pa.; 34 miles, 10-in., contracted, Knappenberger Scraper Trap to Pittsburg Junction, Pa.; 26 miles, 10-in., contracted, Barneytown Scraper Trap to East Freedom, Pa.; Pipe line Construction & Drilling Co.

Natural-Gas Pipe Lines

Algonquin Gas Transmission Co.—278 miles, proposed, Lambertville, N. J., to Boston area; 492 miles, proposed, laterals-New England area.

Amere Gas Utilities Co.—15 miles, 8-in., authorized, KA-8 Flat Top to Beckley, W. Va. Completion date June 1951.

Amere Gas Utilities Co.—11 miles, 8-in., authorized KA-5 loop, Priceton and Athens, W. Va. Completion date December 1951.

Atlantic Gulf Gas Co. (United Gas Pipe Line Co.).—1,530 miles, planned, Alabama-Florida-Georgia-South Carolina.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Central Kentucky Natural Gas Co.—12 miles, 20-in., line E loop, Means to Foster, Ky. Completion date October 1951.

Central Kentucky Natural Gas Co.—15 miles, 20-in., Cold Spring, Ky., to Anderson's Ferry, Ohio. Completion date December 1951.

Cities of Booneville and Baldwin, Miss.—96 miles, ¾ and 6-in., under way, Booneville and Baldwin, Miss.; M. L. Hulcher Co., Inc., contractor, Sam Carnahan, spreadman. Completion date November 1, 1951.

Cities Service Gas Co.—40 miles, 4-10 in., Kansas, field office, Liberal; Pat Gilmore, spreadman; Knupp Construction Co., Inc., contractor.

Cities Service Gas Co.—56 miles, planned, Sedgwick, Harvey, and Labette counties, Kansas.

City of Alabama.—84 miles, 2 to 8-in., under way, Alabama; Modern Welding Co., Inc., contractor, D. D. Foreman, spreadman. Completion date October 1951.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned, Coast and Valley region, California.

Coastal Pipe Line Co.—1,000 miles, planned, Texas to Norfolk, Va.

Colorado Interstate Gas Co.—215 miles, 20-in., planned, Texas Panhandle to Colorado.

Commonwealth Natural Gas Corp.—60 miles, 12¾-in., under way, Petersburg, to Norfolk, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—14 miles, 8-in., under way, Suffolk to Newport News, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—10 miles, contracted, laterals—Richmond, Suffolk, and Portsmouth, Va.; Ray L. Smith, contractor.

Commonwealth Natural Gas Corp.—99 miles, 18-in., under way, Stanardsville to near Petersburg, Va.; Ray L. Smith & Son, contractor, Don C. Smith, Orange, Va., spreadman.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Consolidated Gas Utilities Corp.—41 miles, 12-in., planned, Enid to Blackwell, Okla., Marlow to Cement, Okla.

Egyptian Natural Gas Co.—80 miles, 6-8-in., authorized, Norris City to Salem-Centralia, Ill., area.

El Paso Natural Gas Co.—470 miles, 24-in., under way, San Juan basin, New Mexico, to Franconia, Ariz.

Kansas-Nebraska Natural Gas Co., Inc.—22 miles, 12-in., planned, Holcomb to Scott City, Kans.; 12 miles, 12-in., planned, Blakeeney to Palco, Kans.; 34 miles, 12-in., planned, Palco to Phillipsburg, Kans.; 10 miles, 12-in., planned, Alma to Holdredge, Neb. (replacement lines). 59 miles, 8 and

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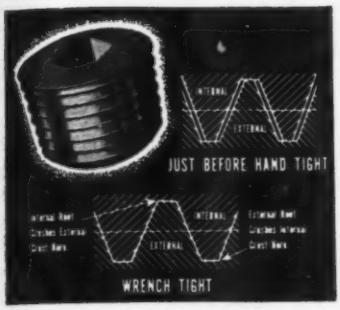
PRESSURE PLUG



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10-in., planned, Grand Island to Albion, Neb.; 40 miles, 6-in., planned, Albion to Norfolk, Neb., 27 miles, 6-in., planned, Albion to Neligh, Neb., 39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in., planned, Neligh to Hartington, Neb. (extension).

Manufacturers Light & Heat Co.—50 miles, contracted, near Pittsburgh, Pa.; 75 miles, near Bradford, Pa.; Britton Contracting Co., contractor.

Michigan Consolidated Gas Co.—180 miles, 24-in., planned, Austin, Mich., to Detroit.

Mid-South Gas Co.—40 miles, 12-in. Helena to Forrest City, Ark.; Tulsa Construction Co., contractor; Frank McCoy, spreadman; field office, Marianna, Ark.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

Nevada Natural Gas Pipe Line Co.—114 miles, proposed, Topock, Ariz., to Las Vegas, Nev.

New River Gas Co.—50 miles, planned, Summers or Monroe counties, W. Va., to Narrows and Dublin, W. Va.

New York States Natural Gas Corp.—26 miles, 20-in., authorized, New Kensington to South Bend, Pa.

New York State Natural Gas Corp.—51 miles, 20-in., authorized, New Kensington, Pa., to Ohio line.

New York State Natural Gas Corp.—27 miles, 16-in. authorized, looping in Greene and Westmoreland counties.

New York State Natural Gas Corp.—70 miles, 20-in., planned, North Oakford, Pa., to Ohio state line.

New York State Natural Gas Corp.—62 miles, 20-in., under way, Murrysville, Pa., to Petersburg, Ohio; 37 miles, 20-in., under way by May, Boome storage field to Ithaca, N. Y. Field office, Lawrenceville, Pa. Completion date October 1951; 23 miles, 20-in., contracted, state line station to Angelica, N. Y. Office, Wellsville, N. Y. Completion date October 1951: 82½ miles, 20-in., under way by May, Utica to Ithaca, N. Y. Field office, Clinton, N. Y., Leman Creech, supt.; 85 miles, 16-in., under way by September, Utica to Albany, N. Y.; Williams-Austin Co., contractor, Ed Peters, over-all general supt.

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way by April 1, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles, up to 20-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—22 miles, 16-in. authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Oklahoma Natural Gas Co.—40 miles, 16-in., Velma to Chickasha, Okla.; Trojan Construction Co., contractor.

Oklahoma Natural Gas Co.—53 miles, 26-in., under way, Edmond to Depew, Okla.; Trojan Construction Co., contractor; "Swede" Tillotson, spreadman; Stroud, Okla., field office.

Oklahoma Natural Gas Co.—40 miles, 16-in., planned, Ninnekah, Okla., to County Line, Okla.; Trojan Construction Co., contractor.

Pacific Gas & Electric Co.—47 miles, 8-in., authorized, Salina to Kilig City, Calif.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Pipe Line Corp.—3,175 miles, 26-in., planned, Texas Gulf Coast to Pacific Northwest.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; 22 miles, 30-in., looping in

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Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas Tex.

Phillips Petroleum Co.—50 miles, 8⅝-in., looping through Oklahoma and Kansas. Gragg Construction Co., contractor. Office, Eureka, Kans., C. H. Gragg, spreadman. Completion date March 31, 1951.

Piedmont Natural Gas Co.—1,350 miles 20-in., planned, Greenville, Miss., to Carolinas.

Potomac Gas Co.—18 miles, 16-in., Dranesville to Arlington, Va.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

South Central Alabama Natural Gas Co., Inc.—150 miles, proposed, central Alabama

South Georgia Natural Gas Co.—248 miles, planned.

Southeastern Michigan Gas Co.—55 miles, 12¾-in.; under way; from point near Clawson, Mich., to Port Huron, Mich.; H. L. Gentry Construction Co., contractor; field office, Utica, Mich.; spreadman, Frank Morris.

Southern Natural Gas Co.—120 miles, 16-in.; under way; Mitchell Village, Ala., to Bolingbroke, Ga.; Associated Pipe Line Contractors, Inc., contractor; Columbus, Ga., field office; Lacy Walker, spreadman.

Southern Natural Gas Co.—138 miles, 20-22-in., planned, Chattanooga, Tenn., to Lexington, Miss.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

Sunray Oil Corp.—133 miles, 3-30-in., system for Snyder gasoline plant, Vaughn & Taylor Construction Co., contractor. D. D Vaughn, spreadman.

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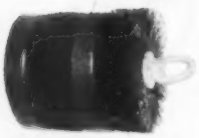
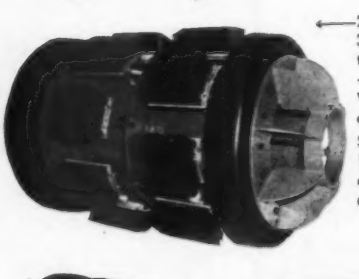
Natural Gas Pipe Lines

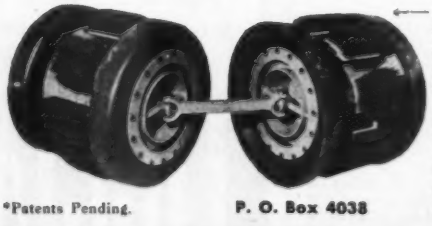


←— 4" Size—TYPE JRN—2" to 4" sizes. Will pass 1½R-90° Bends. No valves other than full diameter thru-port valves. Use TYPE SCN-51 for 6" Size.

←— 8" Size — TYPE WC-11 — 8" to 14". Will traverse 6 foot radius field bends, full diameter side openings at 45°. SPRINGS COMPENSATE for BRUSH WEAR.



←— 20" Size—TYPE GP-2—16" to 30". 200-LB. SPRING Forces the Brushes against pipe wall —COMPENSATING for WEAR. Will traverse round-opening gate or plug valves. SPRINGS and BRUSHES are identical and interchangeable for all types and sizes of GP PIGS.



←— 24" Size — GP-3 — 18" to 30" Sizes will pass 1½R-90° Bends. SPRINGS COMPENSATE for BRUSH WEAR, ASSURING Full section cleaning efficiency. GP-3 consists of two Type GP-1 Pigs. — Each Unit may be used as individual pig.

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Tennessee Gas Transmission Co.—982 miles, 30-in., planned, first 150 miles of loops to be laid at Monroe, La., Greenville, Miss., Midland and Portland, Tenn.

Tennessee Gas Transmission Co.—438 miles, planned, looping on Buffalo and New England extensions.

Tennessee Gas Transmission Co.—175 miles, 24-in., under way, Albany to near Wilmington, Mass.; Office, Pittsfield, Mass., H. A. Wylie, supt., Westfield, Mass., Address Kilgore, supt.; 64 miles, 30-26-in, under way by May 1, Falfurrias and Victoria, Tex., Oklahoma Contracting Co., contractor. Office, Falfurrias, Tex., Panama Shiflett, supt.

The Texas Co.—16 miles, 2-6-10-in., under way, gathering system at Davenport; C. P. Carter Construction Co., contractor. Office Prague, Loyal Bowman, spreadman.

Texas Eastern Transmission Corp.—791 miles, 30-in., planned, Koscuisko, Miss., to Connellsville, Pa.

Texas Eastern Transmission Corp.—33 miles, 30-in., authorized, Connellsville to Delmont, Pa.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized, Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—372 miles, 26-in., proposed, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—580 miles, 26-in., proposed, Louisiana and Kentucky.

Texas-Illinois Natural Gas Pipeline Co.—1,300 miles 30-in., under way, Corpus Christi area to Joliet, Ill.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 26-in., La Gloria to Refugio, Tex.; Midwestern Constructors, Inc., contractor of Schedule 1; M. T. Wilhite, superintendent field office, Refugio.

Texas-Illinois Natural Gas Pipeline Co.—100 miles, 30-in., under way, Mississippi River to Effingham, Ill.; Midwestern Constructors, Inc., contractor of Schedule 11 M. T. Wilhite, superintendent; field office, Du Quoin, Ill.

Texas-Illinois Natural Gas Pipeline Co.—117 miles, 30-in., Effingham to Sibley, Ill., Midwestern Constructors, Inc., contractor of Schedule 12.

Texas-Illinois Natural Gas Pipeline Co.—92 miles, 30-in., Sibley to Joliet, Ill.; Midwestern Constructors, Inc., contractor of Schedule 13.

Texas-Illinois Gas Pipe Line Corp.—409 miles, 30-in., contracted, Arkansas and Missouri; Bechtel Corp. A. M. Berlander, general superintendent; field offices at Newport, Ark., J. E. Richardson; Texarkana Ark., V. L. Williams; Popular Bluff, Mo., A. M. Berlander.

Texas-Illinois Gas Pipe Line Corp.—200 miles, 30-in., contracted; Trinity River to Texarkana; H. C. Price, contractor. Work under way.

Transcontinental Gas Pipe Line Corp.—35 miles, 24-in., authorized, Paterson lateral to Greenwich, Conn.

Trunkline Gas Co.—50 miles, 26-in., contracted, Longville to northeast vicinity of Hineston, La.; 126 miles, 26-in., contracted Epps to Hineston, La.; 42 miles, 16-20-in., under way, Lake Arthur, Longville to point north of Iowa, La., (Section 1, lateral line); 33 miles, 20-in., under way, Lake Arthur, La., to Lacassine, La.; Houston Contracting Co., contractor.

Trunkline Gas Co.—278 miles, 20-in., contracted, Valley of Texas; R. H. Fulton & Co., contractor.

Trunkline Gas Co.—1,775 miles, 10-26-in., planned, includes 740-mile, 26-in., Lake Charles, La., to Tuscola Station of Panhandle Eastern Pipe Line Co., and 1,035 miles, 10-24-in., Lake Charles, La., to McAllen, Tex., completion due October 1, 1952.

Trunkline Gas Co.—176 miles, 26-in., under way, Darnell, La., to Longville, La.; Houston Contracting Co., contractor of Section A, main line. E. C. Norris, Olla, La., spreadman. W. H. Hayes, spreadman, De Ridder, La.

Trunkline Gas Co.—180 miles, 26-in., contracted, Darnell, La., to Senatobia, Miss.;

Anderson Bros. Corp., contractor, Section B, main line.

Trunkline Gas Co.—184 miles, 26-in., under way, Senatobia, Miss., to Paducah, Ky.; R. H. Fulton & Co., contractor of Section C, main line. Clark Williams, Memphis, Tenn., spreadman.

Trunkline Gas Co.—186 miles, 26-in., contracted, Joppa to Tuscola, Ill.; Mahoney Contracting Co., contractor of Section D, main line.

Trunkline Gas Co.—262 miles, 20-in., contracted, McAllen to Altair, Tex.; R. H. Fulton & Co., contractor of Section E and F, lateral lines.

Trunkline Gas Co.—217 miles, 24-in., contracted, Longville, La., to Altair, Tex.; Anderson Bros. Corp., contractor of Sections G and H, lateral line.

United Gas Pipe Line Co.—93 miles, 6 to 16-in., authorized, fields in Plaquemines Parish to near New Orleans.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake Utah.

United Gas Pipe Line Corp.—55 miles, 20-in., under way, Needville to Freeport; Texas Louisiana Contractors.

United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 20-24-26-30-in., from Pure Oil Co.'s offshore platform Block 32 Eugene Island area to Jackson, Miss., comp. sta.; 42 miles, 24-in., from Verna comp. sta., Miss., to Baxterville, Miss., dehydration plant; 52 miles, 20-24-26-in., Lirette to Napoleonville, La. to tie into Eugene Island-Jackson, Miss. 30-in. line mentioned above; 60 miles, 12-16-20-in., from Lafayette comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 59 miles, 30-in., Jackson comp. sta., Miss., to Texas Eastern Trans. Corp. proposed 30-in. line near Kosciusko, Miss.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted to Brown & Root Engineers.

Valley Gas Pipe Line Co., Inc.—500 miles, 24-in., proposed, Berclair, Goliad County, to northeast Saratoga, Hardin County, Texas, to Vermilion Bay area of Louisiana.

Valley Gas Pipe Line Co., Inc.—1,000 miles, 30-in., proposed, Saratoga northeast to Arcadia, La., to El Dorado and Jonesboro, Ark., Cape Girardeau, Mo., Lawrenceville, Ill., Terre Haute, Ind., and Atlanta, Ind., thence to northeast terminal point in southern Michigan.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Westcoast Transmission Co., Ltd.—1,408 miles, 30-in., planned, northern Alberta to Vancouver, B. C., and northern California.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned. Southern Alberta to Duluth, Minn.

York Gas Co. and Corning Glass Co.—30 miles, York, Pa., and Corning, N. Y.; Britton Contracting.

Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta Natural Gas Co.—950 miles, 16-in., proposed, Edmonton south to Kingsgate, B. C., to Washington to Vancouver, B. C.

Basrah Petroleum Co.—72 miles, 12-16-in., under way, Zubair to Fao, Iraq.

Cia. de Petroleo Ganso Azul, Ltd.—40 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A. (Shell).—80 miles, planned, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petrolliferos Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias Syria, 1952; Bechtel-Kirkuk, contractor.

Middle East Pipelines, Ltd.—800 miles, 34-36-in., planned, Iran to a Levantine port.

Montreal Pipe Line Co., Ltd.—68 miles, 18-in., under way, near Highwater, Que., to Montreal East; Fred Mannix & Co., B. V. Elliott, superintendent, Cowansville, Que. (Section 3).

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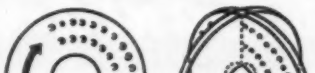

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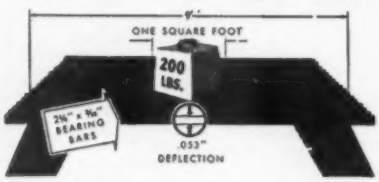

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REFINING

Cracker on Stream

Great Lakes' new unit built in only 11 months

CHICAGO—Great Lakes Refining Co.'s new 6,000 bbl. per day Houdriflow catalytic cracking unit has been placed on stream at the company's refinery here. Construction was entirely engineered by the company and the unit was placed in operation only 11 months after ground breaking.

The cracker will produce high-octane gasoline as its principal product. The company said that because of unit's capacity the refinery will have an unusually high ratio of catalytically cracked gasoline in comparison with refinery throughput.

Acquired in 1945.—Great Lakes, a division of Petco Corp., acquired the Chicago refinery in 1945. It then had a capacity of 3,000 bbl. per day. Facilities for thermal cracking were added in 1946 and expanded in 1948 to boost the plant's capacity. Refinery capacity now stands at 15,000 bbl. per day.

Facilities for storage of 75,000 bbl. are maintained at Chicago. The refinery receives crude by pipe line and ships its products by rail, truck, and barge. Most shipments by water are carried by the company's own tows operating on Lake Michigan.

Petco Corp. also operates a refinery at New Orleans and has sizable wholesale operations through water and rail terminals at Milwaukee, St. Louis, and St. Paul. It maintains its own fleet of barges on Lake Michigan and the Mississippi River.

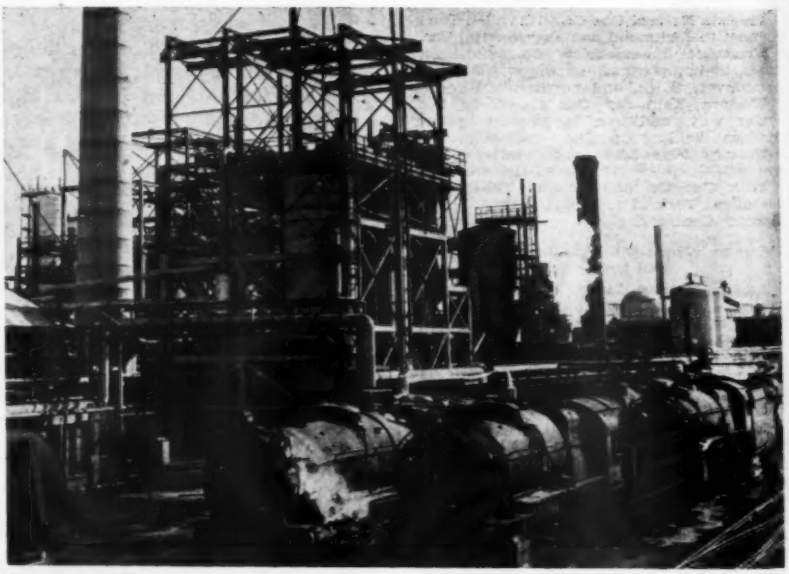
Blending Policy Changed

KANSAS CITY.—The blending of tetraethyl lead with gasoline transported to shippers through Great Lakes Pipe Line Co.'s products lines will be discontinued on April 15, and a policy requiring shippers to blend it at source will be inaugurated by that company.

By carrying through this action, Great Lakes will be matching general industry policy, since nearly all other products pipe lines require that shippers blend their own gasoline before tendering it.

The change will permit Great Lakes to make better utilization of its terminal tankage. Under present conditions, one tank is needed for incoming gasoline, another for leading, and a third for drawing off deliveries.

The company first notified refiners that the change would be effective on March 15, but the action was delayed for a month because of the possibility of confusion resulting from a date too near the effective date of the new Petroleum Administration for Defense lead-allocation order.



"ENGINE-UITY."—When stepped-up military requirements for aviation gasoline recently placed a heavy burden on refinery-steam capacity at Sun Oil Co.'s Marcus Hook, Pa., plant, officials weren't caught napping. Shipment of steam-generating equipment was seriously delayed, and to meet immediate steam demands until the boiler could be installed, Sun Oil leased 12 steam locomotives from Pennsylvania and Reading railroads, which were hooked into the plant's main steam system through manifolds.

The change will mean that company's line-fill will be leaded instead of nonleaded, but it is believed the resulting increase in amount of lead used will be small. The policy is also expected to result in refiners being forced to lead more gasoline in the next few weeks ahead of seasonal demand, but to necessitate smaller amounts than usual later in the season.

Phillips Plans New Cat

BARTLESVILLE, Okla.—Plans for the construction of a $10,000,000 catalytic cracking unit with a 10,000 bbl. per day capacity at Woods Cross refinery near Salt Lake City have been announced by Phillips Petroleum Co.

Contract for design and erection of the plant will be let immediately and construction will begin this summer. The cracker is expected to be in operation by July 1952.

Other improvements to be made at the refinery include vacuum-plant facilities for feed-stock preparation, more raw and finished-product storage and handling facilities, and a new gas plant. A new refinery office building will also be constructed.

Increased capacity at the refinery will probably mean that the company will procure a larger amount of crude oil from Rangely field in Colorado. Phillips now owns or controls about 12,000 bbl. of crude production daily from the field.

The present refinery facilities at Woods Cross are a part of Wasatch Oil Co. holding, which Phillips acquired in 1947.

Styrene Increase Planned

PITTSBURGH. — Koppers Co. is buying about 1,000 acres of land near Port Arthur, Tex., for the site of its new styrene monomer and polystyrene-manufacturing plant. The new plant, along with an announced expansion of the company's Kobuta, Pa., facilities, will increase its styrene monomer production 33 per cent and its output of polystyrene about 25 per cent.

The expansion is estimated to cost several millions. The Port Arthur plant will take ethylene from a unit planned by Gulf Oil Corp. at its Port Arthur refinery, which will be combined with benzene to make ethyl benzene. This will be shipped to Kobuta.

Styrene monomer is an essential ingredient in the manufacture of synthetic rubber, and polystyrene is a basic chemical in the manufacture of plastics.

Meanwhile Monsanto Chemical Co. announced plans to double the capacity of its new styrene plastic plant at Long Beach, Calif. Installation of new equipment is expected to be completed in July.

Refining Briefs

Standard Oil Co. of Ohio has begun construction of a $1,000,000 products terminal at Toledo. The terminal will have an 85,000-bbl. capacity and will be linked with Sohio's Toledo refinery by a 15-mile pipe line. It will serve the Toledo area.

Foster Wheeler Corp. has received an order from International Petroleum Co., Ltd., for two water-tube package-steam generators. The boilers, largest manufactured, each has a capacity of 30,000 lb. steam per hour, a design pressure of 250 psi., and an operating pressure of 150 psi.

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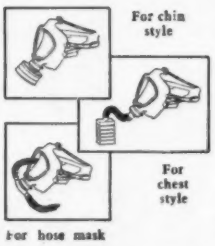

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Among the Drilling Contractors

Miller Made Delta Gulf Manager in West Texas

C. G. Miller, formerly drilling and production superintendent for H. S. Moss, independent operator, Dallas, has joined the organization

C. G. MILLER

of Delta Gulf Drilling Co., Tyler, Tex., as manager of the latter's company's West Texas division. He will make his headquarters at Odessa, where he will move soon from his present residence in Big Spring.

A native of Many, La., Miller was initiated into the oil business as a driller's helper in the nearby Swolle field. He moved to South Texas in 1933 and spent several years in the production department of Tide Water Associated Oil Co. He went to Texon Royalty Co. of San Antonio in 1943, and was in charge of that company's drilling and production operations until 1947, when he became associated with the Moss organization.

L. L. Stanton is drilling superintendent for the company in the West Texas district, and will continue in direct charge of the eight rotary rigs which the company now is operating in that area.

Contracts for two additional wells to be drilled by Mazda Oil Corp. in the new north extension area being opened by that operator at Ringwood, Major County, Oklahoma, have been awarded **Mid-Union Drilling Corp.** and **Warren & Bradshaw Drilling Co.**, both of Tulsa. The former will drill 1-B Wolf, NE SW NW 25-22n-10w, a 40-acre location east of the extension discovery well, 1 Wolf, now being completed in the field's Manning sand pay zone around 6,800 ft. The latter contractor will drill 1 Vance, NE SW SW Section 25, ½ mile to the south of the discovery.

Wimberly Drilling Co., Tyler, Tex., has a rig working for R. W. Fair at 1 Wilkerson Unit, an edge-well location for the Walter Fair area of eastern Kaufman County, eastern Texas. Projected depth is 4,300 ft.

Lyons, Prentiss & McCord, Shreveport, will drill a 3,500-ft. wildcat test a mile northeast of the Converse field, Sabine Parish, Louisiana. Contract is with H. R. Barker of Oklahoma City. Location is for 1 Burr, in the SE SE NE 2-9n-13w.

Johnson Drilling & Service Co., Magnolia, Ark., is the contractor on Lion Oil Co.'s latest well on the Shuler unit, in Union County, Arkansas. The well is No. 144. Contract is for 6,000 ft.

B & B Drilling Co., Pauls Valley, Okla., has contracted for a well to be drilled for James E. Kemp of Dallas at a location about a mile east of the recently revived West Pauls Valley pool, Garvin County, Oklahoma. Location is for 1 Camp, SW SW NE 27-4n-1w. The above pool produces from the Bromide zone, found around 4,700 ft.

Tex-Mex Drilling Co., Dallas, will drill Bert Fields 1 J. M. Trosper, a projected 6,500-ft. test on the south edge of the Waskom field, Harrison County, eastern Texas.

Thomas P. Pike Drilling Co., Los Angeles, has started the second of a series of exploratory wells which it has contracted to drill for E. W. Pauley in northern Tamaulipas, Mexico, under the latter operator's agreement with Petroleos Mexicanos, the Mexican Government's oil agency.

Norwood Drilling Co., Wichita Falls, Tex., has a rig running for James H. Snowden at 1-16 J. W. Driver, an 8,500-ft. rotary test in the new Driver Spraberry area, Midland County, West Texas. Location is a southeast offset to the discovery well.

Nebraska Drillers, Inc., Ogallala, Neb., has a contract for a projected 4,200-ft. wildcat test to be drilled in the East Timpas area, southwest of LaJunta, in Otero County, Colorado.

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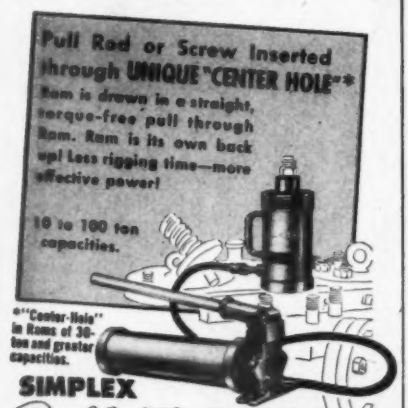
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The test will be drilled for A. B. Oldham and associates. It will be designated as 1 Gaulke. Location is in the NE NE NE 15-26s-56w.

Warren & Bradshaw Drilling Co., Tulsa, has work under way on a contract it has with Seaboard Oil Co. for a Springer sand test (projected depth 10,000 ft.) in the Graham pool, Carter County, southern Oklahoma. The test, 1 Martha Bennett, is in the NE SW NE 31-2s-2w, ½ mile west of the Graham townsite.

W. H. Black Drilling Co., Midland, Tex., has a large rotary rig working on a projected 13,500-ft. wildcat test which Ralph Lowe is starting about a mile west of Midland, in Midland County, West Texas. Location is on the Iney G. Fasken lease, in Section 6, Block 39-2s, T&P Survey.

Wilson & Wilson, New Harmony Ind., will be the rotary contractors on a well which W. E. Glass of St. Paul will drill in the Lamott pool area, east of Mount Vernon, southern Posey County, Indiana. The well will be 1 Scherer with location in the SW NW NE 13-7s-13w.

Standard-Fryer Drilling Co., Dallas, has a contract with Texas Mid-Continent & Southern Corp., a recently organized firm with headquarters at Fort Worth, for a Caddo test, approximately 6,000 ft., to be drilled about 6½ miles southeast of Bowie and about a mile east of Solona, in Montague County, North Texas.

Pacific Drilling Co., Long Beach, has a rig contracted to R. B. Watkins for drilling 1 Luce, 14-11n-28w, a wildcat in the Cuyama Valley area, San Luis Obispo County, California.

Tiger Drilling Co., Oklahoma City, has moved a rig to a wildcat location 4 miles northwest of Newkirk, in northern Kay County, Oklahoma, where it will be a 4,000-ft. Mississippian test for Aurora Gasoline Co. at 1 Kucera, NE NE NE 18-28n-2e.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 3-12-51	Change week ended 3-5-51	Change week ended 3-13-50
Gulf Coast	515	+ 8	+ 24
W. Tex.-N. M.	783	— 6	+ 85
Ark.-N. La.-E. Tex.	138	+10	+ 7
Oklahoma	293	+14	+ 42
Kansas-S. Nebraska	156	+31	+ 30
Illinois-Eastern	41	+18	— 40
Rocky Mountains	113	+ 5	+ 50
Pacific Coast	138	0	+ 12
Total United States	2,177	+80	+210
Western Canada	97	— 8	+ 26
Total	2,274	+72	+236

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the Rocky Mountain and western Canada areas are shown by charts on pages 392 and 393.

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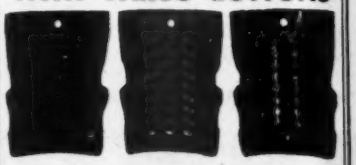

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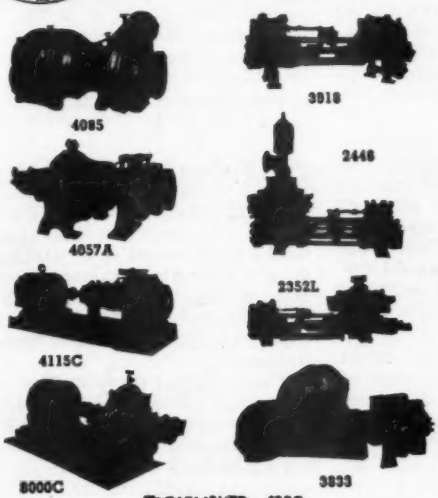

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NATURAL GAS

El Paso Expansion

Three applications filed totaling $92,000,000

WASHINGTON.—El Paso Natural Gas Co., which early in January filed an application with the Federal Power Commission seeking authorization to expand the capacity of its natural-gas-transmission system in Arizona, New Mexico, and Texas by 400,000,000 cu. ft. per day, has filed a motion for withdrawal of that application, and filed three separate ones in its place.

In one application, the company proposes construction of facilities to make available an additional 100,000,000 cu. ft. of gas daily to customers in Arizona, New Mexico, and Texas. This would include about 10½ miles of 30-in. main-line loop, 37,160 hp. in new and existing main-line compressor stations, about 36 miles of field lines, 18,910 hp. in field compressor stations, and other field facilities. Cost is estimated at $23,250,000.

More gas to West Coast.—The second application, to furnish 200,000,000 cu. ft. of additional gas to Southern California Gas Co., Southern Counties Gas Co., and Pacific Gas & Electric Co., would cost about $51,720,000. Construction would include 112.9 miles of 30-in. loops, 98,000 hp. in additional compressor capacity; about 179½ miles of field lines, 36,540 hp. in field compressor stations, and miscellaneous plants and field facilities. The gas would be delivered to the Arizona-California border.

Pacific Gas & Electric Co. would receive an additional 100,000,000 cu. ft. of gas under the third application. It would be delivered at the Arizona-California border near Topock, Ariz., at a cost estimated at $16,970,000.

This project calls for 25,050 hp. at new and existing main-line stations; 50.9 miles of field lines, and additional 2,700 hp. at an existing field plant, field plants and facilities, and gas wells.

Canadian Firm Seeks Gas

WASHINGTON.—Union Gas Co., of Chatham, Ont., Canada, began presentation of evidence before the Federal Power Commission last week in support of its application to get more than 18 billion cubic feet of natural gas annually from the United States.

A contract has already been signed with Panhandle Eastern Pipe Line Co., of Kansas City, Mo., for that amount subject to FPC approval.

The case now being heard is concerned with allocation of Panhandle's new capacity which will be made available later this year. The company's capacity will be increased from 550,000,000 to 800,000,000 cu. ft. per day with the completion of Trunkline Gas Co.'s new line extending from the Rio Grande Valley to a connection with the Panhandle system at Tuscola, Ill.

Some doubt has been expressed that the Canadian firm will get all the gas it is seeking. A commission staff member said that a total of 807,000,000 cu. ft. per day have been requested by customers of Panhandle in the United States. This would call for more capacity than the company will have available when the expansion project is completed.

Union Gas proposes to serve almost all of southwestern Ontario west of Hamilton if the Panhandle deal goes through. The contract would provide Union with about 50,000,000 cu. ft. per day, or about one-fifth of Panhandle's new capacity.

Gas Expenditures Estimated

OMAHA.—About $875,000,000 will be spent on gas-industry expansion this year, provided material restrictions are not too severe, D. A. Hulcy, president of the American Gas Association, has announced. Expenditures as estimated for 1951 fall well below the 1950 total of $1,060,000,000.

Hulcy said the natural-gas industry is in much better condition to supply fuel for American homes and industry now than it was during World War II. Proved reserves on December 31 amounted to 185,600 trillion cubic feet, an increase of more than 5 trillion cubic feet at the same date in 1949.

Steel Presents Problems

NEW YORK.—The outlook of the natural-gas-transmission industry for the immediate future is precarious because of a contest between the oil and gas industries for steel pipe to meet expansion plans, Claude A. Williams, president of Transcontinental Gas Pipe Line Corp., said recently. Williams spoke at a meeting of National Federation of Security Analysts.

The natural-gas industry will require an estimated 1,500,000 tons of pipe to construct proposed new pipe lines in 1951, Williams said, while the oil industry this year will require 1,800,000 tons. He said neither industry will get all the pipe it requests, but that each will probably get a fair portion of estimated requirements.

Williams predicted that the gas industry's expansion this year will not be as rapid as during the past 5 years as a result of the national emergency. The possibility exists that all pipe-line expansion will be halted until the emergency ends.

Future expansion by the natural-gas-transmission industry will not include construction of any new transcontinental lines, he said, with the possible exception of a line to the Northwest. New expansion will be directed toward meeting increasing demands for natural gas from nearly every community now being served.

FPC Forms May Be Changed

WASHINGTON.—The Federal Power Commission has issued a notice of proposed rule making which would amend regulations under the Natural Gas Act relating to the form and filing of applications for certificates of public convenience and necessity.

The proposed revision, the commission said, would (1)help eliminate sketchy and incomplete applications which require extensive correspondence to supply deficiencies by placing upon the applicant the burden of adequate presentation of certificate applications in intelligible form; (2) provide for the filing of abbreviated applications in the case of relatively minor operations, sales, service, construction, extensions, or acquisitions; and (3) provide general improvement in the form and content of applications.

Any interested person may submit data, views, and comments concerning the proposed amendments to the FPC in writing within the next 60 days.

Applications Consolidated

WASHINGTON. — The application for construction of new facilities submitted to the Federal Power Commission by New River Gas Co., of Radford, Va., has been consolidated with proceedings involving five other applications.

New River seeks authority to build a 50-mile line to serve five cities in southwestern Virginia, and to get gas from Atlantic Seaboard Corp. In all of the cases the applicants propose to obtain their gas supply from subsidiary companies of Columbia Gas System, Inc.

Other applications were submitted by Warwick Gas Corp., of Florida, N. Y., and Crystal City Gas Co., of Corning, N. Y., which have asked FPC to direct Home Gas Co. to supply them with gas; Citizens Gas Co., of Stroudsburg, Pa., and Bangor Gas Co., of Bangor, Pa., which want gas from Manufacturers Light & Heat Co.; and Pen Argyl Gas Co., of Pen Argyl, Pa., which would get gas indirectly from Manufacturers through a connection with Bangor Gas Co.'s system.

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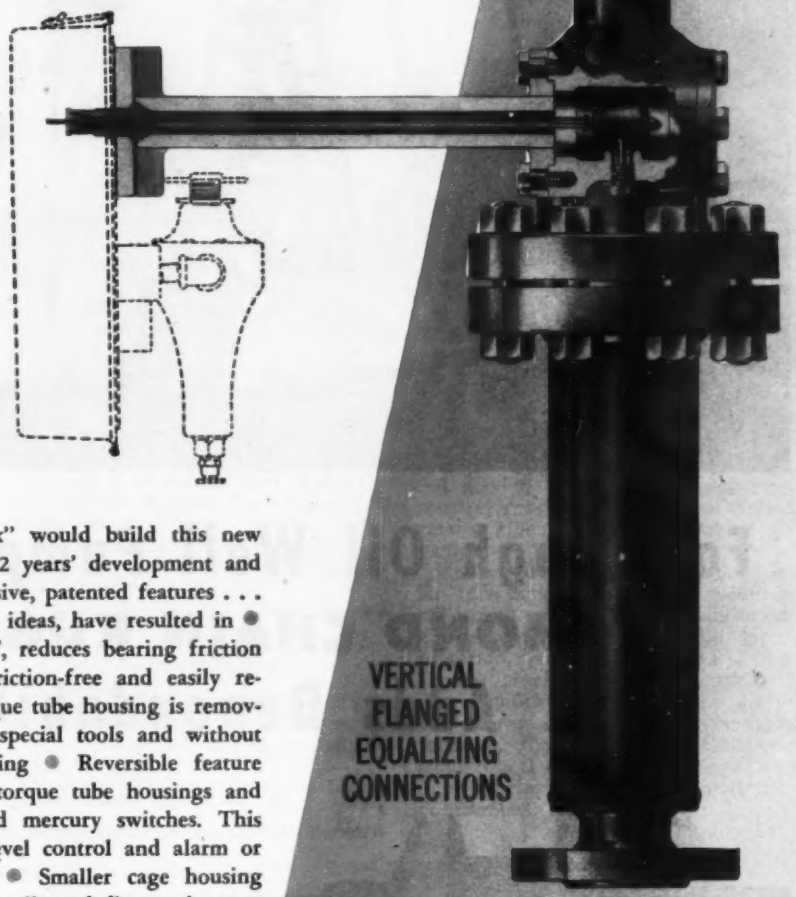

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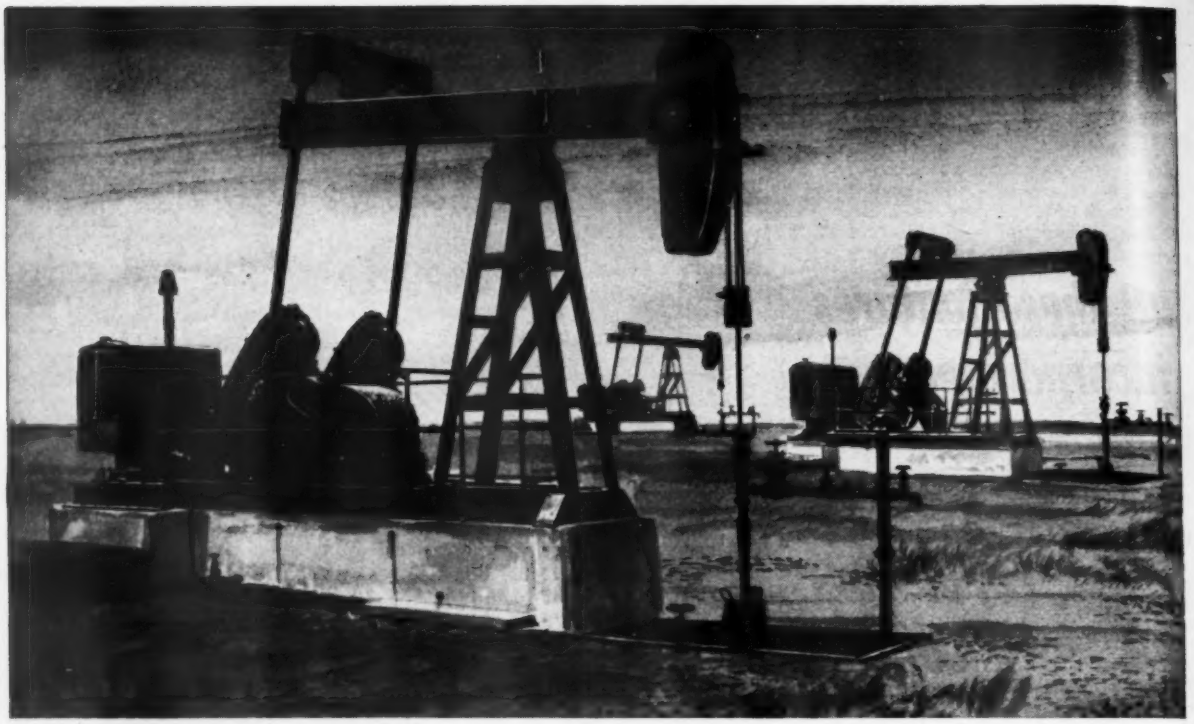

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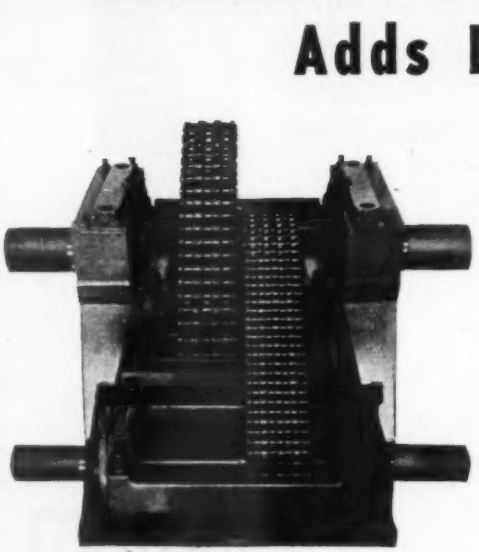

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Electric-Log Interpretation Test

ADVANCES in the science of electric logging and electric-log interpretation have been so rapid in the last few years that the layman who relies on electric logs to help him in his search for oil-producing horizons in a bore hole is completely lost.

First of all, in the right hands an electric log can tell a great deal more than most laymen realize. Expert log interpreters can get porosity, per cent water saturation, salinity of formation water, oil-water contacts, and, sometimes, permeability.

Many laymen still use logs just as they did 10 or more years ago. Some have no idea of how to use the lateral and "deep penetration" curves. They don't want them "cluttering up" their logs. They don't realize that these curves are an important part of a modern log and from them may come a significant portion of the information that a log has to offer.

Not too many years ago instruction in electric-log interpretation took a matter of a few minutes. After brief instruction a man was considered qualified to pick promising-looking intervals for testing, to set pipe, and call perforation intervals. This practice resulted in many time and money-wasting tests and the missing of many intervals that would produce.

In tried and tested areas this cursory method worked wonders, but now and then what looked like a good oil or gas sand produced only water or nothing at all. In other instances where only water was expected a big flow of water-free oil resulted. It became obvious that something was wrong. Some blamed the logs and decided that there wasn't much to them. Others blamed only their own inadequacies and decided to find out what the kicks and wiggles really meant under a variety of conditions.

It was found that there was a host of factors affecting the shapes and magnitudes of the spontaneous potential and resistivity curves. These included mud resistivity, formation-water resistivity, thickness of beds, porosity, per cent water saturation, electrode-spacing type or length, resistivity of adjacent beds, hole diameter, mud-invasion effects, and colloid contaminations.

If you think you know something about the interpretation of electric logs check your ability by calling the following statements "true" or "false."

Spontaneous Potential Curve

High S.P. in millivolts always indicates good porosity and permeability.

Low S.P. in millivolts always indicates poor or negligible porosity and permeability.

Large S.P. kicks in millivolts are the most important part of the S.P.

Low kicks are of minor importance.

Small changes in curvature should be ignored.

Top of a permeable bed is always one-half the distance from shale line to S.P. peak.

Apparent high S.P. in limestones always indicates good permeability and porosity.

S.P. curve in limestones means nothing.

Resistivity Curve

High resistivities indicate oil or gas.

Low resistivities indicate water.

Low resistivities on long normals always indicate water.

There is a depth lag in the lateral curve.

The lateral or the "deep penetration curves" always overcome mud-invasion effects.

The apparent resistivity is the true resistivity.

Highest resistivity indicates best oil-gas saturation.

Lowest resistivity indicates poorest oil-gas saturation.

Oil and gas cannot be detected in fresh water-bearing formations.

The slope of a lateral at an oil-water contact is the correct resistivity gradient.

At oil-water contacts, the first drop of the lateral is the best plug-back point.

A good fit of the plotted apparent resistivity values on departure curves always gives the true resistivity directly.

Unless you are an expert, or have for one reason or another followed all recent technological advancement in the science of electric-log interpretation, you probably had a few "trues" stuck in with the "falses." You shouldn't have, because all of the above statements are common fallacies, though in some instances some of these statements are true due to a combination of fortunate circumstances.

Philip C. Ingalls

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Sinclair's 1 McElroy Ranch, Ellenburger discovery, at last report had approximately 167 ft. of Ellenburger section and the last drill-stem test flowed slightly over 100 bbl. of oil in 2 hours. Operators were reaming the core hole to drill ahead. In Cochran County, Blackwood & Nichols 1 Dean extended San Andres production 2 miles with a calculated daily potential of 338 bbl. of oil a day from pay at 5,013-38 ft. Location is on the southwest flank of the big Slaughter area.

ROCKY MOUNTAIN AREA.—General Petroleum Corp. is coring Tensleep after finding Embar saturation at a west extension to Slick Creek, Wyoming. The well, 44-32-P, will be the first drilled to the Tensleep on the structure. Three important wildcats, and possible discoveries, are nearing completion in the current Denver-Julesburg Basin play.

MID-CONTINENT.—Three possible pay zones, two of which have tested oil shows, have been encountered in a Roger Mills County venture in the far western part of Oklahoma. W. A. Delaney, Jr., 1 Newton found saturation in two granite wash zones at 10,969-93 ft. and 9,157-9,212 ft., and below 11,000 ft. hit an encouraging stray sand which has not yet been evaluated.

XUM

Kansas

Graham County Wildcat Gets Lansing Oil Shows

DISCOVERY of another pool in Graham County appears to have been made by Harry Gore at his 1 Law, NE NE SE 34-9-23, where good saturation was logged in the Lansing-Kansas City lime section. The location is 7 miles southwest of the Fargo pool, nearest production, in the south central part of the county. Hole is being carried to the Arbuckle.

Top of the Lansing was logged at 3,741 (—1,283 ft.), and the base of the Kansas City at 3,966 ft. Two drill-stem tests were made. The first, with tool open 30 minutes, was of an interval at 3,810-22 ft. where mud and water with a small show of oil was obtained. The next, with tool open 20 minutes, took in an interval at 3,815-35 ft. and got 600 ft. of free oil and 900 ft. of heavily oil-cut mud with 600 ft. of water. Flowing pressure was 790 psi. A good oil show was logged at 3,926-32 ft., near the base of the section, but no test was attempted.

Anschutz Drilling Co. has a prospective producer in its 1 Reidel, CEL 10-17-14, a wildcat located about 1½ miles northeast of the Carroll pool, in Barton County. Good showings were found in both the Lansing-Kansas City and Arbuckle horizons. A 26-minute drill-stem test at 3,278-85 ft. in the Lansing, topped at 3,212 ft. (—1,227 ft., showed considerable gas and yielded 1,800 ft. of clean oil in the breakdown. A 30-minute test at 3,352-63 ft. got a good blow and yielded 90 ft. of heavily oil and gas-cut mud. Rotary hole has been drilled to 3,562 ft. in Arbuckle lime, topped at 3,559 ft.

Tom Palmer 1 Boyd, NW NW NW 4-21-14, a wildcat located a mile northwest of the Star pool in northwestern Stafford County, filled 3,000 ft. of clean oil when plug was drilled to test Arbuckle lime at 3,572-77 ft. It filled 2,700 ft. the first hour. Testing is under way.

In the same county, W. H. Hartman 2 Jordan, NW NW SE 26-24-12, 1½ miles south of production in the Stafford pool, made an average of 1 bbl. of oil per hour on initial tests before acidizing. Pay zone is the Lansing-Kansas City, topped at 3,507 ft. (—1,631 ft.) and drilled to 3,529 ft.

Two miles northeast of the Berland pool, in southwestern Rooks County, Jones, Shelburne & Farmer 1 Lynd, SE SE SE 32-9-19, had 450 ft. of clean oil in the pipe following a 15-minute drill-stem test at 3,750-37 ft. in Arbuckle lime, topped at 3,749 ft. (—1,544 ft.). Casing has been run for completion.

Heathman Drilling Co. 1 Bassett, SW SW SE 20-10-20, another southwestern Rooks County wildcat, swabbed 20 bbl. of oil in a 5-hour period after acidizing. It is testing Arbuckle lime, topped at 3,747 ft. (—1,581 ft.), and drilled to 3,767 ft. Casing, run to 3,757 ft. in the pay, is perforated at 3,753-55 ft.

Herndon Drilling Co. has completed a confirmation well for the new pool it opened last year in Scott County, in the western part of the state. The new well, 1 Chance, SW SW SW 19-18-31, a diagonal northeast offset to the discovery well, pumped 95 bbl. of oil per day on potential tests. Hole is open in the Lansing pay zone at 3,998-4,012 ft. The discovery well produces from perforations at 4,000-08 ft. The new pool, 5 miles southeast of Scott City, is 15 miles from nearest other production.

KANSAS SUCCESSFUL WILDCATS

Barton County: Lewis Drilling Co. 1 Keener, NE NW SE 9-18s-14w, pumped 50 bbl. oil per day from Sooy at 3,416-22 ft., and Arbuckle at 3,430-44 ft., TD.; OWWO.

Butler County: Rex & Morris et al., 1 Sparks, SW NE SE 20-25s-4e, 25 bbl. of oil per day from Mississippian at 2,510-39 ft., TD 2,960 ft., Kansas City 2,070 ft., Mississippi chat 2,490 ft., Viola 2,665 ft., Simpson 2,764 ft., Arbuckle 2,790 ft.

Clark County: Stanolind Oil & Gas Co. 1 Wall, C NE SE 35-32s-23w, 129 bbl. of oil per day from Viola at 6,526-36 ft. and 6,560-86 ft., TD 6,859 ft., Lansing-Kansas City 4,404 ft., Mississippi lime 5,310 ft. St. Genevieve 5,360 ft., Warsaw 5,875 ft., Osage 6,085 ft., Simpson shale 6,606 ft., Simpson sand 6,671 ft., Arbuckle 6,779 ft.

Ellis County: Okmar 1 Sessin, SE SE SE 15-11s-19w, 400 bbl. of oil per day from Arbuckle at 3,455-64 ft., TD; anhydrite 1,325 ft., Topeka 2,890 ft., Heebner 3,116 ft., Lansing-Kansas City 3,160 ft., Sooy 3,402 ft.

Seward County: Jomilson 1 Light est. "B," C SW 11-35s-32w, 3,000 bbl. of oil from Morrow sand at 6,020-30 ft., TD 6,342 ft., Mississippi lime 6,202 ft.

KANSAS WILDCAT FAILURES

Butler County: Rex & Morris 1 Knauss, SE SW NW 20-23s-5e, dry, TD 2,685 ft., Mississippi chat 2,427 ft., base Mississippi lime 2,570 ft., Viola 2,678 ft.

Musgrove 1 Belford, SW SE NE 16-27s-3e, dry, TD 3,133 ft., Heebner 1,749 ft., Stalnaker 1,988 ft., Kansas City 2,310 ft., Mississippi lime 2,825 ft., Mississippi chert 2,832 ft., Simpson 3,107 ft., Simpson dolomite 3,108 ft., sand 3,128 ft.

Bay Petroleum 1 Lucas, NW NW SE 23-28s-6e, dry, TD 3,263 ft., Mississippi lime 2,947 ft., Simpson 3,228 ft., Arbuckle 3,229 ft.

Coffey County: Goble 1 McGrew, NE SW SE 12-20s-14e, dry, TD 2,235 ft., sandy lime 672 ft., lime 680 ft., shale 708 ft., lime 711 ft., sand 719 ft., lime 730 ft., Kansas City 775 ft., sand 1,415 ft., Bartlesville 1,673 ft., Mississippi chert 1,731 ft., Mississippi lime 1,738 ft., green slate 2,025 ft., shale 2,035 ft., lime 2,037 ft., shale 2,086 ft., green shale 2,095 ft., lime 2,156 ft., sand 2,180 ft., lime 2,183 ft., sandy lime 2,185 ft., sand 2,205 ft.

Harvey County: Ingling 1 Whiteman, SW SW SE 35-24s-1e, dry, TD 3,550 ft., Lansing 2,350 ft., Kansas City 2,542 ft., Burgess 3,011 ft., Mississippi lime 3,044 ft., Kinderhook 3,328 ft., Hunton 3,460 ft., Maquoketa 3,510 ft., Viola 3,521 ft., Simpson 3,540 ft.,

Morris County: Sohio 1 Granzow, SE SE SW 28-15s-5e, dry, TD 2,290 ft., Lansing 1,665 ft., Kansas City 1,960 ft., Mississippi chat 2,173 ft., Kinderhook 2,274 ft.

Norton County: Flournoy - Williams 1 Thomas, SE SE SE 13-5s-21w, dry, TD 3,562 ft., anhydrite 1,692 ft., Heebner 3,268 ft., lime 3,296 ft., Lansing-Kansas City 3,310 ft., Marmaton 3,503 ft., Arbuckle 3,538 ft.

Rice County: Calkan 45-24 Smith-Atlantic, NE NE SW 24-19s-7w, dry, TD 3,690 ft., Heebner 2,666 ft., lime 2,816 ft., Lansing-Kansas City 2,845 ft., Mississippi lime 3,277 ft., Kinderhook 3,305 ft., Misener 3,505 ft., Maquoketa shale 3,510 ft., Viola 3,564 ft., Simpson 3,591 ft., Arbuckle 3,665 ft.

Rush County: Brack 1 Conard, NW NW SE 35-19s-17w, dry, TD 3,935 ft., anhydrite 1,200 ft., lime 3,542 ft., Lansing-Kansas City 3,568 ft., Arbuckle 3,869 ft.

Sedgwick County: Kruse-Potter 1 Melick, SW NW SE 21-25s-2e, dry, TD 3,441 ft., Kansas City 2,464 ft., Burgess 2,892 ft., Mississippi lime 2,904 ft., Hunton 3,281 ft., Sylvan 3,324 ft., Viola 3,330 ft., Simpson 3,354 ft., Arbuckle 3,431 ft.

EASTERN NEBRASKA WILDCAT FAILURE

Richardson County: Peters 1 English, SE NE NE 7-3n-17e, dry, TD 2,610 ft., Mississippi lime 2,381 ft., no Hunton.

SOUTH CENTRAL NEBRASKA WILDCAT FAILURE

Gosper County: L. Phillips et al., 1 Dawson, C S/2 NE 2-5n-22w, dry, TD 3,765 ft., Carlile shale 940 ft., Greenhorn 1,162 ft., Graneros 1,195 ft., Dakota 1,290 ft., base Lakota 1,812 ft., Morrison 1,852 ft., Permian 1,889 ft., anhydrite 2,145 ft., Topeka 3,242 ft., Lansing-Kansas City 3,373 ft., granite wash 3,702 ft., weathered granite 3,709 ft., granite 3,754 ft.

California

Operators in All-out Effort To Augment Production

LOS ANGELES.—Notices for drilling new wells filed with the Division of Oil & Gas indicate California operators are even further intensifying their efforts to develop additional crude supplies. For the past 2 weeks these notices have averaged 57 weekly, whereas during February the average was 39 weekly.

During the first 2 months of this year, the number of oil wells completed totaled 219, as compared with 174 in the like period of 1950. With drilling activity scheduled to go even higher, as reflected by the notices to drill, the added production of the new wells probably will be more than sufficient to offset the state's oil production decline.

At Elk Hills, where additional development of the shallow zone will shortly be started, the deep test being drilled by Standard Oil Co. of California may have found a deeper pay below the Stevens zone. The test, X-55 30-R, in the west central part of the huge field, reportedly cored a tight oil sand from 9,280-9,363 ft. At the latter depth, drilling was halted to make a formation test of the interval. The exploratory hole may be carried to 14,000 ft.

On the southeast end of San Joaquin Valley, near Wheeler Ridge, Hancock Oil Co. was preparing to start a second test. The new wildcat, 52-35 Kern County Land Co., is to be drilled in NE Section 35-11n-20w. It was staked one location southwest of 61-35, which was abandoned earlier this month after oil shows were recovered on a drill-stem test at 6,009-21 ft. The test falls about 1¼ miles southwest of Wheeler Ridge field and 3 miles northwest of Tejon Ranch production.

In the Caliente Range area of San Luis Obispo County, about midway between Midway-Sunset production and Cuyama Valley fields, W. R. Whittaker Co. has a wildcat nearing 1,000 ft. in depth. The 1 Reay-Whittaker, located in SW Section 6-10n-25w, is being drilled in an area which has had little activity.

In the Los Angeles region, Humble was proceeding with the completion of its 4,500-ft. east extension to Castaic Junction field near Newhall. About midway in the extension area, the company has staked location for its 5 Newhall Land & Farming Co.

In the same area, about 3½ miles northwest of San Fernando, W. W. Bush is reported to have picked up several hundred feet of oil-bearing sand in the 1 Bartholomaus Canyon. The wildcat, located in Section 6-2n-14w, according to the operator had the oil show at a depth around 3,000 ft. East of the town of Whittier, in Section 22-2s-11w, Los Nietos Co. has staked location for a wildcat, 1 Whittier Crude.

CALIFORNIA SUCCESSFUL WILDCAT

Kern County, Kern River, ¼ mile north extension: Douglas & Von Breyman 1 Anderson, 18-28s-28e, pumped 10 bbl. 12°-gravity oil per day from 1,024-1,128 ft., TD 1,171 ft., elev. 940 ft.

CALIFORNIA UNSUCCESSFUL WILDCATS

Fresno County, Tranquility area: The Texas Co. 1 Sutherland, 1-16s-14e, dry, TD 7,820 ft., elev. 255 ft.

Kern County, Comanche Point area: Kova Pet. Assoc. 1 Kova-Pet., 32-32s-30e, dry, TD 1,029 ft., elev. 873 ft.

Mt. Poso area: Yellowstone Oil Co. O-14-16 KCL, 16-26s-28e, dry, Vedder 1,006 ft., TD 1,047 ft., elev. 1,035 ft.

Gould Hills area: Los Nietos Co. 81-18 Richardson, 18-29s-21e, dry, TD 7,810 ft., elev. 950 ft.

Tejon Hills area: J. F. Kosanke 8 Kosanke, 11-11n-18w, dry, TD 492 ft., elev. 1,100 ft.

Tejon Ranch area: Standard Oil Co. 71-6

Baash-Ross News

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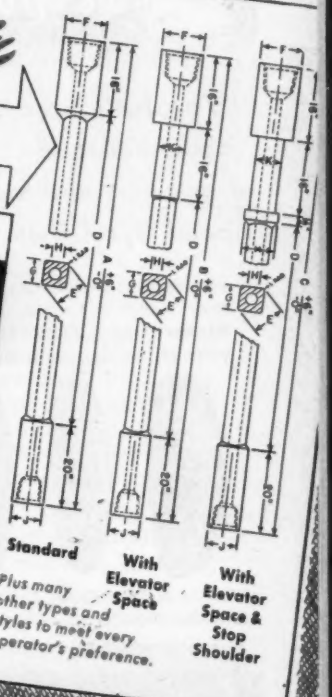
						Ins.	F Ins.	Ins.	J Ins.	H Ins.	E Ins.	G Ins.	K Ins.	L Ins.	M Ins.	
2½	35	36–40	36–60	32	30	4½ Reg.	5½"	2⅜ Reg.	3⅛	1¼	3⅜	2½	2⅞	1/16	3⅝	.165
	38	39–40	39–60	35	33	6⅝ Reg.	7⅛	2⅞ I.F.	2⅝	1⅝						.327
	40	41–4	41–60													
2¾	35	36–40	36–60	32	30	4½ Reg.	5½"	2⅜ Reg.	3⅛	1¼	3⅛	2½	2⅞	1/16	3⅝	.165
	38	39–40	39–60	35	33	6⅝ Reg.	7⅛	2⅞ I.F.	2⅝	1⅝						.327
	40	41–4	41–60													
3⅛	35	36–40	36–60	32	30	4½ Reg.	5½"	2⅜ Reg.	3⅛	1¼	3⅛	2½	2⅞	1/16	3⅝	.165
	38	39–40	39–60	35	33	6⅝ Reg.	7⅛	2⅞ I.F.	2⅝	1⅝						.327
	40	41–4	41–60													
4½	35	36–40	36–60	32	30	4½ Reg.	5½"	2⅜ Reg.	3⅛	1¼	4⅜	3½	3⅞	⅛	4⅝	.165
	38	39–40	39–60	35	33	6⅝ Reg.	7⅛	2⅞ I.F.	2⅝	1⅝						.327
	40	41–4	41–60													
	54	55–4	55–60		51											
5⅛	38	39–40	39–60	35	33	6⅝ Reg.	7⅛	2⅞ I.F.	2⅝	1⅝	5⅛	4⅛	4⅞	⅛	5⅝	.165
	40	41–4	41–60													.327
	54	55–4	55–60		51											
6	38	39–40	39–60	35	33	6⅝ Reg.	7⅛	2⅞ I.F.	2⅝	1⅝	6	5⅛	5⅞	⅛	7	.327
	40	41–4	41–60													
	54	55–4	55–60		51											

Sizes shown in RED are A.P.I. standard.
* Alternate 5¾ inches O.D.—180 cu. ft. per lineal ft
† Volume based on largest diameter of body



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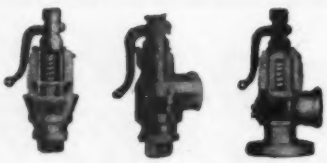

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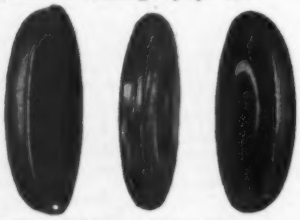

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Tejon Ranch 10, 6-10n-18w, dry, TD 1,000 ft., elev. 914 ft.

Merced County, Turlock area: R. E. Peterson 1 C & O, 15-6s-9e, dry, TD 1,300 ft., elev. 103 ft.

Santa Barbara County, Cuyama Valley area: E. H. Christian Drlg. Co. 1 Christian, 33-11n-28w, dry, Dibblee sand 1,490-1,581 ft., Cretaceous 1,581 ft., TD 1,604 ft., elev. 2,165 ft.

Tulare County, Visalia area: Ebonoro Oil Co. 1 Alves, 15-17s-25e, dry, Granite 425 ft., TD 473 ft.

Michigan

Rank Wildcat Tests Shallow Traverse Oil

MOUNT PLEASANT.—Gulf Refining Co. logged a Traverse oil pay that showed gas in 8 minutes and several hundred feet of free oil on drill-stem test at the 1 Ruckel, NE SW NW 18-14n-18w, Shelby Township wildcat, Oceana County, early this week. Traverse lime was topped at 1,732 ft., and the section was cored from 1,738-63 ft. with a 100 per cent recovery. Porosity was showing at 1,754-63 ft. with some evidence of salt water reported in the bottom 2 ft. of the core. Packer was set at 1,735 ft. The hole carried 400 ft. of oil, 450 ft. of mud-cut oil, 45 ft. of drilling mud, and 50 ft. of salt water at the conclusion of the 60-minute test. A string of 5-in. casing was run and cemented at 1,732 ft. Completion was delayed until a cable tool cleanout unit could be moved to location. The wildcat was reported to be about 20 ft., or more, higher structurally than surrounding correlating control points. The Traverse pay zone was described as being about the same as the so-called Stony Lake pay found in the field of the same name which is located approximately 6 miles to the south.

Gulf was reported to control approximately 2,000 acres of leases within a radius of 1 to 2 miles around this wildcat. Other companies and individual operators own scattered pieces in the play, with the largest spread outside of Gulf's owned by Turner Petroleum Corp. with 240 acres located close in to the west.

This same general area had been leased previously by another major company, cored drilled, tested in the lower zones by one or more wildcats supported by this major, and then the acreage was released. Gulf acquired the acreage after this other activity, but was reported not to have projected this wildcat on the basis of the previous core-drill program, but more on a sample analysis and survey of cuttings from nearby tests, which according to Gulf's research department, indicated possible presence of a Traverse reef in the area.

MICHIGAN SUCCESSFUL WILDCATS

Midland County, Jerome Township: Michigan Oil Co. 1 State-Jerome, NW SW NE 13-15n-1w, Dundee 3,683 ft., flowed 28 bbl. of oil per day through ¼-in. choke after 4,000 gal. acid, TD 3,820 ft., PB 3,795 ft.

Ogemaw County, Foster Township: Brazos Oil & Gas Co. 1 Fisk Bros., N½ SW NW 14-24n-1e, 15 bbl. of oil per day from Richfield, TD 5,062 ft., PB 4,271 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Valley Township: Ford Oil Co. 1 Guffis, SE SE NW 30-2n-14w, Traverse 1,299 ft., dry, TD 1,310 ft.

Gladwin County, Sherman Township: Mogul Oil Co. 1 Johnson, SW NE SW 33-20n-2w, Dundee 3,880 ft., dry, TD 3,965 ft.

Tuscola County, Elkland Township: C. W. Collin 1 Habicht, SW SE NW 19-14n-11e, Dundee 2,720 ft., dry, TD 2,925 ft.

Van Buren County, Pine Grove Township: Merrill Drilling Co. 1 Spalding et al, NE SE NW 29-1s-13w, Traverse 1,329 ft., dry, TD 1,331 ft.

Eastern Texas

Texas Co. Gas Prospect Continues Testing Pettit

DALLAS.—Testing was under way at The Texas Co. 1 Lula Mason, Limestone County Rodessa gas discovery southeast of Thornton. The well was drilled to 8,389 ft. and had no shows in the Travis Peak. Casing was set at 7,507 ft. and perforated in the lower Pettit from 7,334-54 ft., where a 1-hour drill-stem test recovered water cushion, of which 180 ft. was cut with distillate. Perforations were squeezed. One more section of the Pettit was to have been tested before moving up to the Rodessa.

A northeast edge well in Walter Fair field had prospects of completion from the Woodbine. R. W. Fair 1 Wilkerson unit, John Spikes Survey, set casing at 4,144 ft. after recovering 330 ft. of oil and 30 ft. of gas-cut mud on a 5-minute test from 4,144-57 ft.

Eugene Talbert 1 J. M. Tuggle, in the Ham-Gossett area of Kaufman County, was drilling ahead following a test to 4,032 ft. in the lower Woodbine which had no shows. The well is an east offset to T. D. Humphrey 1 Fritz, which has indicated possible pay from three different zones.

In Sandusky field of Grayson County Kimbell & Simms 1 G. D. Freeman, B. S. Scarborough Survey, completed as the second Pennsylvanian well in the area. Total depth was 7,125 ft., in the Oil Creek which was dry. Completion was on the pump for 44 bbl. of oil a day in sand at 6,847-59 ft.

A possible new pay for the Sandusky area was reported at Kimbell & Sims 1 T. L. Miller, S. Carmena Survey, located on the south edge of the area. A drill-stem test in the Strawn from 6,951-88 ft. recov-

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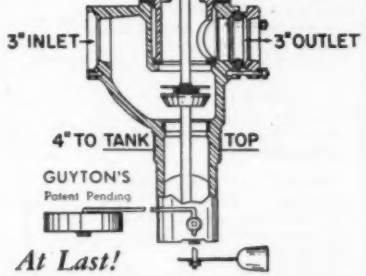

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ered 360 ft. of heavily oil-cut mud. Drilling continued below 7,082 ft.

The new sub-Clarksville area west of Pine Mills in Wood County was in line for additional development. E. B. Germany & Sons, Dallas, staked location for a well southwest of Deupree & Palmer 1 Slayton, sub-Clarksville prospect. The new test is to be the 1 W. F. Bartlett, in the J. B. Tucker Survey. J. M. Deupree staked location for 1 Liberty School Lands, as a west offset to the 1 Slayton.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Upshur County: Stanolind Oil & Gas Co. 1 M. M. Irvin, Robertson Asher Sur., 2½ mi. N Ore City, dry, TD 11,048 ft., Travis Peak 7,832 ft., Cotton Valley 9,310 ft.

Wood County: Stanolind 1 R. L. Peveto, Sarah McDonald Sur., 2 mi. SW Yantis, dry, TD 8,504 ft., Woodbine 4,340 ft., Paluxy 6,195 ft., Glen Rose 6,555 ft., Massive anhydrite 7,580-7,732 ft., Travis Peak 8,220 ft.

Jim Wells County: New pay at Hollow Tree—The Texas Co. 3 H. M. Cornelius, SPRR Sur. 17, 1 mi. S7 Alfred, TD 4,302 ft., perf. 3,472-82 ft., 85 bbl. oil per day on pump, gravity 28°.

San Patricio County: Oil discovery, Portland—The Texas Co. 1 Joseph F. Green est., T. T. Williams Sur. 29, A-286, TD 11,105 ft., perf. 9,515-24 ft., 28 bbl. oil per day, 16/64-in. choke, gravity 44°.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) WILDCAT FAILURES

Bastrop County: August Kothman 1 Herbert Schroeder, R. Young Sur. 16, A-373, dry, TD 2,435 ft.

Duval County: Camp & Sons-DeLange & Chumney 2 Jose Rangel, M. Ranjel Sur. 1, A-477, dry, TD 2,822 ft.

Guadalupe County: J. P. Bristow & Co. 1 Fritz Tschoepe, John Ussery Sur., A-323, dry, TD 1,995 ft.

Elbert Farmer 1 Hettie E. Adams, J. M. Bell Sur., A-75, 5 mi. SW Luling, dry, TD 2,658 ft.

Jim Hogg County: George Buck 1 Rosa Palacios, Mrs. G. C. Hendrix Sur. 291, A-161, dry, TD 2,913 ft.

O. W. Killam 3 Vela, H&GN Sur., A-183, dry, TD 2,865 ft.

James G. McCarrick 1 C. W. Hellen, Y. Guiterrez Sur. 52, A-146, dry, TD 3,206 ft.

LaSalle County: Kirkwood & Morgan, Inc., 1 Bill Dollar, I&GN Sur. 26, Block 5, dry, TD 3,480 ft.

Nueces County: Carnes W. Weaver 1 Mary P. Cable, Sec. 29, Laureles Farm Tracts, 10½ mi. S Corpus Christi, dry, TD 7,520 ft.

San Patricio County: The Chicago Corp. A-1 J. F. Odem, Archibald Herron Sur., A-166, 1 mi. E Sinton, dry, TD 8,390 ft.

Travis County: E. R. Marts 1 Ashmore heirs, Lemuel Kimbro Sur., 4 mi. E of Manor, dry, TD 760 ft.

Webb County: Appell Drilling Co. 1 Sam Stockbridge, Porcion 9, 16 mi. NW Laredo, dry, TD 4,422 ft.

Southwest Texas

Sun Brings In Well Close to Discovery

CORPUS CHRISTI. — Approximately ¾ mile southwest of Sun Oil Co. 10 Jones, discovery well of East Jones field, Sun perforated at 4,619-27 ft. in 1 A. C. Jones-State, Antonio Garza Acevada Survey 276, Starr County. Operator swabbed and the well flowed 140 bbl. of oil per day through 9/64-in. choke. The well was drilled to a total depth of 4,947 ft. and set 5½-in. pipe at 4,676 ft. The well is now shut in for pressures.

In the Dagger Island area of Nueces County, Atlantic Refining Co. 1 State, Tract 341 is at total depth of 9,503 ft. with 7-in. casing cemented at 8,846 ft. Operator perforated at 7,334-44 ft., and in 12½ hours the well flowed 34 bbl. of net oil per day through ¼-in. choke. Salt-water content was 30 per cent. Tubing pressure was 1,150 psi. on the test. Operator squeezed perforations, plugged back to 7,319 ft., and is currently waiting on cement. The other Dagger Island wildcat is Sunray Oil Corp. 1 State Tract 352, which is coring below 7,250 ft. for zone 10-A.

Gilbert L. Brown 1 J. F. Welder et al, Norman G. Collin Survey A-868, 10 miles northeast of Freer, Duval County, is at total depth of 2,940 ft. and operator has set pipe on or near bottom. The well is being drilled "tight," however, late reports are that operator is testing oil in the hole. Depth of the perforations is unknown. This well is located 1¾ miles southeast of Seven Sisters field.

Continental Oil Co. has staked location for a new rank wildcat of considerable importance in the central part of Gonzales County. The company will drill 1 Joe Thomas to a depth of 5,500 ft. It is located 4 miles south of the town of Gonzales, in Nathaniel Osborne Survey, Abstract 368.

Another interesting wildcat for South Texas is W. W. Carter et al 1 Milton Davis, Solomon Simmonds Survey 1439, Abstract 767, Atascosa County. The well has a projected 5,500-ft. depth which should be deep enough to test the Navarro zone.

In Kleberg County, C. G. Glasscock 1 W. K. Cumberland, wildcat test in Block 15, Section 22, Kleberg Town & Improvement Co. subdivision, had little show around 6,900 ft. but the sand was too tight. Operator is coring ahead at 7,025 ft. in sandy shale.

SOUTHWEST TEXAS (DISTRICTS 1 & 4) SUCCESSFUL WILDCATS

Brooks County: Oil discovery, North Lopez—Magnolia Petroleum Co. 7 Duval County Ranch Co., Sec. 196, DCRC Sur., 196, A-853, 12 mi. SW Freer, TD 2,105 ft., perf. 2,064-68 ft., 92 bbl. oil per day, ½-in. choke, gravity 20°.

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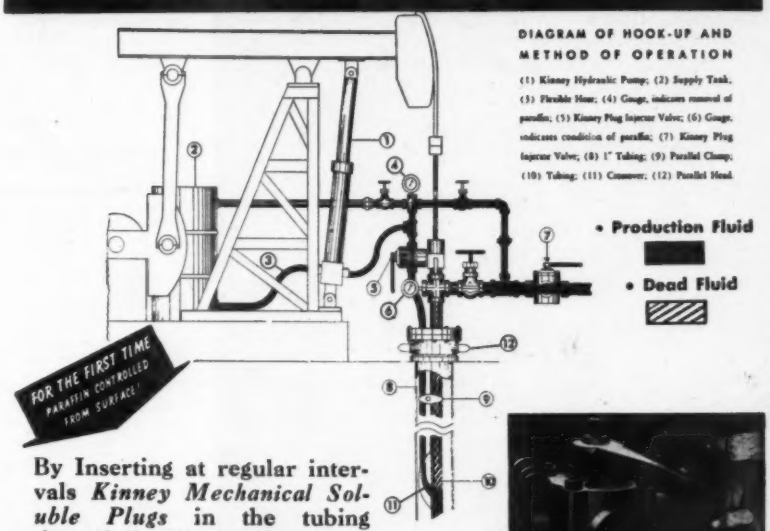
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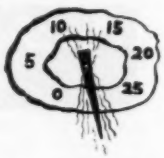

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North Central Texas

Wolf Field Gets Third Pay Zone

WICHITA FALLS.—S. D. Johnson, Gene Autry et al 2 Perkins-Collum, in Wolf field of west central Jack County, gave that two-pay area its third productive zone in the Bend conglomerate. Casing had been perforated between 4,856-66 ft., after drilling to 4,931 ft. The well kicked off and flowed 168 bbl. of 42°-gravity oil in 15 hours. Testing was to continue. Location is ½ mile northwest of nearest production, which is from the Caddo.

Jennings, Wheeler, and Ingraham 1 J. R. Clayton, a long stepout test on the northwest side of the same field, flowed 364 bbl. of 42°-gravity oil in 24 hours from the Caddo at 4,617-85 ft. The flow was through ½-in. choke. Field reports indicated the well may be considered a new strike, rather than an extension to the field.

Both oil and distillate extensions were reported for Jupiter field of northeastern Jack County. Star Oil Co. 2-A Cherryhomes, ¼ mile southwest of an oil producer, made 300 bbl. of distillate a day with 5,000,000 cu. ft. of gas, from casing perforations in the conglomerate at 5,270-80 ft. Location is 1¼ miles west of the nearest gas-distillate well in the field. Oil production on the north side of the field was extended 1¼ miles by Jack Grace Production Co. and Star Oil 1-A Kempner, with a flow of 46 bbl. of oil in 24 hours through 20/64-in. choke. Testing was to continue through perforations from 5,668-70 ft.

Northwest of Joplin, Russell Maguire 1 Jagoda drilled conglomerate with oil shows from 4,497-4,509 ft. A 1-hour test of the section had gas in 17 minutes and recovered 180 ft. of oil, plus the same amount of heavily oil-cut mud. A successful completion would mark a southwest extension to Rusmag (conglomerate) field. The well had no shows in the Caddo from 4,468-97 ft.

NORTH TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: Perkins & Cullum 1 Conner, A. D. Palmer Sur., 4 mi. SE Anarene, TD 5,175 ft., elev. 1,164 ft., Mississippian 5,150-75 ft., flowed 839 bbl. 44°-gravity oil a day, various chokes, TP 425 psi., GOR 800 cu. ft.

Eastland County: A. B. Bradley 1 Mrs. M. E. Holcomb, John House Sur., 2 mi. E Eastland, TD 3,170 ft., elev. 1,444 ft., perf. Lake sand 3,122-44 ft., pumped 15 bbl. 40°-gravity.

Jack County: Coston & Cline 2 Cherryhomes, J. Kuykendall Sur., 7 mi. SE Jacksboro, TD 5,656 ft., perf. conglomerate 5,516-30 ft., flowed 131 bbl. 43°-gravity oil a day, 15/64-in. choke, TP 350 psi., GOR 1,200 cu. ft.

Texas Canadian Oil Corp. 1-A M. M. Garrett, BBB&C Sur., 2½ mi. NW Antelope, TD 5,737 ft., perf. Strawn 3,028-47 ft., pumped 80 bbl. oil a day.

Wichita County: C. W. Snoddy 1 F. L. Cruse, K&N Subd., Cherokee CSL, 5 mi. S Wichita Falls, TD 3,833 ft., pay 3,861 ft., pumped 56.7 bbl. oil in 12 hr.

NORTH TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Coleman County: Hickok & Reynolds Royalty Co. 2 Miller, IRR Sur., 3½ mi. NW Echo, dry, TD 3,467 ft., elev. 1,668 ft., Caddo 2,657 ft., Ellenburger 3,437 ft.

Mid-Continent Petroleum Corp. 1-A Mary Horne, 102-1-GH&H, 5 mi. SE Talpa, dry, TD 3,950 ft.

Denton County: Continental Oil Co. 1 Sherrill, J. Grigger Sur., 9 mi. NW Sanger, dry, TD 1,931 ft.

Fisher County: V. C. Perini, Jr., 1 Sam Swann, Speers Sur. 283, 4 mi. NW Trent, dry, TD 5,516 ft., elev. 1,923 ft., Canyon reef 4,689 ft., Strawn 4,950 ft., Caddo 5,390 ft., Ellenburger 5,496 ft.

(Continued on page 168)

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Oklahoma

Deep Wildcat Tests Oil In Roger Mills County

TESTING of prospective pay zones encountered by W. A. Delaney, Jr., in his 1 Oscar Newton, deep wildcat located in the C SE SW 17-11n-23w, southwest of Berlin, southern Roger Mills County, in the extreme western part of the state, is under way. First zone to be tested was in granite wash, opposite which casing was perforated at 10,769-93 ft. An initial drill-stem test of this interval yielded 180 ft. of free oil and 300 ft. of oil and gas-cut mud with about 540 ft. of drilling mud. Tester was open 7 hours and 10 minutes. Flow pressure gaged 280 psi. When the well was shut in, bottom-hole pressure built up to 2,410 psi. in 30 minutes. Operators had logged approximately 20 ft. of saturation while drilling but at that time had failed to get a drill-stem test of the zone.

The well has another prospective granite wash pay zone logged at 9,157-9,212 ft. where a drill-stem test at the time the section was drilled yielded 210 ft. of heavily oil-cut mud (10 per cent 40° oil) with 280 ft. of gas-cut mud. Another possible pay lies just below 11,000 ft. where a stray sand was encountered, but no evaluation of it has been made. Total depth of the hole is 11,051 ft. with 5½-in. casing cemented at 11,040 ft.

Casing is being run in another deep wildcat in the same general area. It is United Carbon Co. 1 Clark Unit, C NE NW 32-12n-21w, about 15 miles northeast of the Delaney test in northeastern Beckham County. Total depth is 11,844 ft. Small oil and gas showings were encountered in various zones, although their commercial importance were questionable. Drill-stem tests yielded oil and gas-cut mud with small amounts of high-gravity oil. Most recent test was of an interval at 10,574-630 ft. Hole has been standing for the past week pending decision of operators to run casing.

Carter Oil Co. has succeeded in killing high gas pressures encountered in its 1 Garrett, SE SE SE 32-11n-25w, another deep wildcat in the same area. With the well completely under control, the hole has been deepened 1 ft. to 10,298 ft., pipe pulled and electric log run to 10,294 ft. Operators at latest report were circulating and conditioning mud preparatory to deepening. This wildcat, located north of Mayfield, in northwestern Beckham County, is approximately 13 miles southeast of the above mentioned Delaney wildcat across the line in Roger Mills County.

H. C. Coshow and associates are attempting to make a well out of an old abandoned hole, their 1 Coulter, C SW NW 15-22n-9w, located about a mile east of Meno and about 4 miles northeast of the Ringwood field, in Major County. The hole was drilled by Wilcox Oil Co. to 7,890 ft. in 1946 and quit as dry. Present operators have cleaned out the hole and run 5½-in. casing to 6,942 ft. The casing has been perforated at 6,609-19 ft. and 6,629-49 ft. opposite a sand believed to be equivalent to the Manning pay zone of the Ringwood field. Following acidization (20,000 gal. of acid) of the prospective pay zone, the well started cleaning to the pits and at latest report was making about 25 bbl. of fluid, approximately 50 per cent oil, per hour.

C. R. Colpitt appears to have a good producer in his 1 Payton, SE SE NW 27-17w-3e, which opens a new Skinner sand pool in northern Lincoln County. The well is only a mile south of the East Sporn pool, which also produces from the Skinner, but is separated from that production by dry holes. It flowed initially at the rate of 35 bbl. of clean oil per hour from a total depth of 3,992 ft. Top of the sand is 3,987 ft., where casing was cemented.

OKLAHOMA SUCCESSFUL WILDCATS

Grady County: Extension to Knox—Wegener 1 Todd, SW SE SE 1-3n-6w, pumped 61 bbl. of 37°-gravity oil per day from Hoxbar sand at 4,722-30 ft., TD 4,865 ft.

Hughes County: Helmerich & Payne 1 Myers, SW SW NE 9-7n-10e, open flow 750,000 cu. ft. of gas per day from Cromwell at 3,567-79 ft., TD 4,922 ft., Bartlesville 1,866, Hartshorne coal 2,630 ft., Hartshorne sand 2,632 ft., Gilcrease 2,908 ft., Wapanucka 3,290 ft., Union Valley 3,546 ft., Mayes 4,190 ft., Woodford 4,330 ft., Hunton 4,431 ft., Sylvan 4,444 ft., Viola 4,548 ft., second Wilcox 4,882 ft.

Pittsburg County: Able Oil Co. 1 Dallas James, C NE NE 28-2n-15e, pumped 2 bbl. of 40°-gravity oil per day from sandy lime at 392-422 ft., TD 537 ft., sand 335 ft., show of oil, sandy lime 532 ft.

Pottawatomie County: Arrow Drilling Co. 1 Farris (was Baker), NW NE SE 24-10n-2e, pumped 32 bbl. of oil per day from Bartlesville at 5,096-5,120 ft., TD 5,855 ft., OWWO, was dry, Oswego 4,780 ft., Earlsboro 4,986 ft., Mississippi lime 5,263 ft., Woodford 5,330 ft., Hunton 5,455 ft., Sylvan 5,513 ft., Viola 5,610 ft., Wilcox 5,744 ft., second Wilcox 5,837 ft.

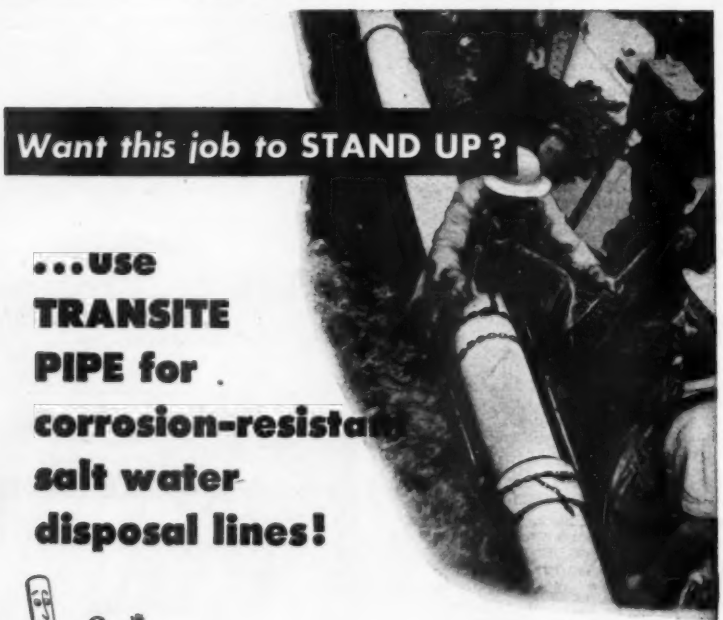
OKLAHOMA WILDCAT FAILURES

Beckham County: Shell Oil Co. 1 Bloomer, C SW SW 20-10n-20w, dry, TD 10,455 ft., no tops reported.

Garfield County: W. O. Allen 1 Moore, SE SE NW 26-22n-3w, dry, TD 5,658 ft., Foraker 1,825 ft., lower Pawhuska 2,668 ft., Oread 3,080 ft., Lovell 3,290 ft., Layton 4,195 ft., Hogshooter 4,374 ft., Oswego 4,700 ft., Cherokee 4,875 ft., basal Pennsylvanian-Mississippian 5,115 ft., Woodford 5,377 ft., Viola 5,434 ft., Wilcox 5,500 ft., second Wilcox 5,636 ft.

Garvin County: Carter Oil Co. 1 Evans, SE SW NW 4-2n-1w, dry, TD 5,300 ft., Deese 5,023 ft., Viola 5,164 ft.

Falcon Seaboard Drilling 1 Mays, C NW SW 9-4n-2w, ddy, TD 6,545 ft., Douglas 4,512 ft., Dewey 5,354 ft., Hogshooter 5,670 ft., Checkerboard 5,830 ft., second Checkerboard 5,983 ft., Deese 6,002 ft.,



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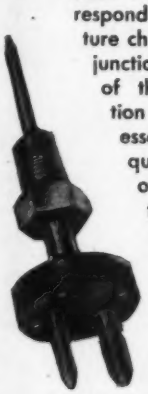

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second Deese 6,253 ft., Gibson 6,390 ft., Hunton 6,493 ft.

Jefferson County: Dudley-Gorham 1 Seay, SW SW SW 21-6s-5w, dry, TD 2,305 ft., Arbuckle 2,269 ft.

(Continued on page 168)

Permian Basin

Upton County Strike Finds Second Pay

MIDLAND.—Sinclair Oil & Gas Co. 1 McElroy Ranch, Upton County discovery southwest of Pegasus field, found additional pay section in testing from 12,154-12,209 ft. The 4-hour test, through 1-in. top and ¾-in. bottom chokes, had gas in 35 minutes and flowing oil in 2 hours and 10 minutes. It was cleaned into tanks for 5 minutes. During the first hour into tanks it flowed 56.9 bbl. of oil and 43.9 bbl. the second hour. Oil was 53° gravity, and there was no formation water. Open flowing bottom-hole pressure ranged from 1,025-3,625 psi. At total depth of 12,209 ft., the wildcat had 167 ft. of Ellenburger section. Operators prepared to ream the core hole and drill ahead and continue testing. The well has also proved Pennsylvanian production by flowing 56 bbl. of clean oil in 1 hour from limestone at 9,376-9,411 ft.

According to field reports, Wilshire Oil Co. had staked locations and was preparing to move in for west and northwest offsets to the discovery. Wilshire and Standard Oil Co. of Texas farmed out a number of sections in the area to Sinclair for drilling the venture.

Sinclair 7 Sanders, Midland County outpost to Peck field, had oil on a drill-stem test in the Fusselman. The 2-hour test from 12,600-60 ft., recovered 60 ft. of heavily oil and gas-cut mud and 30 ft. of 37°-gravity oil.

Magnolia Petroleum Co. 1 Jo Jo Parks, west stepout to Parks field, prepared to drill-stem test to 10,920 ft. after logging porosity in the Pennsylvanian.

Third producer for Parks field, and a ½-mile east extension, was in prospect at Magnolia 1 J. F. Haley, Section 72, on location south of a producer. On elevation of 3,252 ft., sample top of the reef was 10,164 ft., or minus 6,912 ft. Water table in the field is around 6,975 ft. A drill-stem test from 10,175-10,225 ft. recovered water cushion plus mud and salt water. Operators were to drill ahead to around 10,500 ft.

Plymouth Oil Co. 1 Jefferson Davis, Martin County wildcat, had developed no new oil in swabbing 7,320-90 ft., in the Spraberry. The section had been treated with Hydrafrac. With the swab running near bottom, recovery was averaging about 1/6 bbl. of load oil an hour.

Highest well on the reef, in Wellman (Wolfcamp) field of southwest Terry County, was said to be Anderson-Prichard Oil Corp. 2 Scales, on the northeast side of the field. Top of the reef was 9,346 ft., or minus 6,053 ft. General water table in the field is minus 6,625 ft., which would give the well some 550 ft. of possible pay section above the water. Operators were to drill through approximately 500 ft. of the section and try for completion.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crockett County: Continental Oil Co. 1 C. T. Harris, 15-3-WCRR Sur., 9 mi. NE Iraan, TD 8,685 ft., elev. 2,505 ft., Devonian 8,621 ft., perf. 8,610-22 ft., flowed 1,099 bbl. 40°-gravity oil a day, ½-in. choke, GOR 1,947 cu. ft., TP 900 psi.

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Garza County: Continental Oil Co. 2 Swenson, 43-2-H&GN, TD 8,150 ft., elev. 2,360 ft., reef 6,842 ft., perf. 6,855-95 ft., pumped 232 bbl. 33°-gravity oil a day.

Runnels County: Ashmum and Hilliard 1 Mrs. Nora McCaughan, T. M. Fowler Sur., 2 mi. NE Norton, TD 4,529 ft., elev. 1,847 ft., Strawn 4,105 ft., perf. 4,492-28 ft., flowed 117 bbl. oil a day.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Andrews County: Anderson - Prichard 1 Fasken "I," 1-41-3n-G&MMB&A Sur., dry, TD 5,186 ft., elev. 3,040 ft., Yates 3,220 ft., Grayburg 4,710 ft.

Borden County: Norwood Drilling Co. 1 W. D. Johnson, 34-32-5N-T&P, dry, TD 8,500 ft., elev. 2,555 ft., Spraberry 5,985 ft., Dean 7,300 ft., reef 8,380 ft.

Coke County: Hunt Oil Co. 1 F. McCabe, 28-Z-D&SRR, 7½ mi. SW Robert Lee, dry, TD 6,621 ft., Strawn 6,552 ft.

Crockett County: C. E. McCaughey 1 Noelke, 5-JH-I&GN, dry, TD 3,200 ft.

Howard County: Pan American Production Co. 1 Mildred M. Jones, 36-33-3N-T&P, dry, TD 8,364 ft., elev. 2,743 ft., San Andres 3,463 ft., Spraberry 6,308 ft., Dean 7,565 ft., reef 8,326 ft.

Runnels County: Cree Drilling Co. 1 Lynn Stokes, L. S. Evans Sur., 6 mi. N Ballinger, dry, TD 4,000 ft.

Humble Oil & Refining Co. 1 Mrs. F. Gentry, GH&H Sur., 2¼ mi. S Marie, dry, TD 5,456 ft., elev. 1,835 ft., Palo Pinto 4,172 ft., Ellenburger 5,226 ft.

Gorden Witherspoon et al., 1 L. A. Faubion, I. P. Wallace Sur., 3½ mi. SE Crews, dry, TD 4,003 ft., elev. 1,973 ft., Palo Pinto 3,185 ft., Capps 3,510 ft.

Scurry County: Wilshire Oil Co. 1 Whatley, 406-97-H&TC, dry, TD 8,578 ft., elev. 2,670 ft., Wolfcamp 6,030 ft., reef 7,820 ft., Strawn 7,960 ft., Mississippian 8,160 ft., Ellenburger 8,396 ft.

Tom Green County: Scherck & Wahlenmair 1 Llano CSL, Llano CSL 964, dry, TD 6,581 ft., Strawn 5,512 ft., Ellenburger 6,362 ft.

SOUTHEASTERN NEW MEXICO

HOBBS. — A second drill-stem test had shows of oil at Lawton Oil Corp. and W. L. Goldston 1-A State, Lea County wildcat 5 miles southwest of Saunders field. Last marker reported was the Wolfcamp at 9,256 ft. The deeper sections tested had not been identified at this report but probably were in the Pennsylvanian.

A 4-hour test from 10,166-10,212 ft., using 1,000 ft. of water blanket, had gas in 50 minutes, and while pipe was pulled unloaded 1,000 ft. of heavily oil and gas-cut water cushion, 1,980 ft. of oil, 510 ft. of mud-cut oil, and 90 ft. of oil and gas-cut mud. A test in the Wolfcamp returned gas and some oil and gas-cut mud, and the section from 10,130-86 ft. developed some gas at the surface and recovered heavily oil and gas-cut mud. Operators were drilling ahead below 10,305 ft.

Sharpless Oil Co. 1 Seth Alston, an old wildcat being deepened from 5,127 ft., 8 miles southwest of Tatum, was drilling below 11,860 ft. in limestone. A drill-stem test between 11,163-11,303 ft. developed gas in 32 minutes, rated around 30,000 cu. ft. daily and recovered 684 ft. of oil and gas-cut mud, said to be about 30 per cent oil.

In Chaves County, Shamrock Oil & Gas Co. 1 Lightcap, 13-8s-29e, was drilling lime and shale at 8,899 ft. Top of the Mississippian was 8,015 ft. No shows have been reported.

In Eddy County, Continental Oil Co. 1 Thurman - Federal, 11-16s-27e, was drilling below 7,423 ft. A test in the Hueco section, at 6,315-45 ft., developed 30 ft. of slightly gas-cut mud but no shows of oil.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Stanolind Oil & Gas Co. 2 Leonard, 12-26s-37e, dry, TD 11,235 ft., elev. 3,029 ft., Queen 3,400 ft., Glorietta 5,105 ft., Tubbs 6,310 ft., Devonian 8,650 ft., Silurian 8,810 ft., Fusselman 9,270 ft., Montoya 9,800 ft., McKee 10,665 ft., Ellenburger 11,160 ft.

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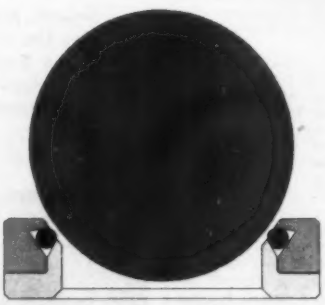

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Rocky Mountain

Denver-Julesburg Basin Has Three New Prospects

DENVER.—Three interesting wildcats in the Denver-Julesburg Basin of Colorado and Nebraska have not had final tests but are possible discoveries. Eddie Fisher and C. E. Stout of Denver have cemented casing at 1 State, SW SW SE 36-6n-55w, in the Messex area, Morgan County, 2 miles southwest of Merino field. This well made 540 ft. of oil in 1-hour drill-stem test in the Dakota between 5,085-93 ft. The operators have not drilled plug for tests of the well. Ohio Oil Co. has logged water in the third Dakota sand at its Marlowe area wildcat, Cheyenne County, Nebraska, and is expected to cement casing and produce the well from the second sand. The well is 1 Sparks, NE SE NE 29-15n-49w, and on drill-stem test it made 1,060 ft. of clean oil and 90 ft. of mud in 30 minutes. This will be Ohio's sixth discovery in the Cheyenne County area. Orin Tucker is still waiting on tools prior to testing 1 Hough, NW NE NE 1-2s-57w, wildcat in the Little Beaver area, Adams County, Colorado. Casing was cemented at 5,560 ft., total depth. The well logged some saturation in cuttings in the Muddy between 5,174-90 ft., but drill-stem test in the zone failed.

General Petroleum Corp. is now coring below 10,878 ft. in the Tensleep at 44-32-P, SE SE NW 32-47n-92w, west offset to the Slick Creek, Washakie County, Wyoming, discovery. The well is the third to be drilled in the field, and the first to the Tensleep. General Petroleum found saturation in the Embar formation, but decided to look at the Tensleep prior to completing the discovery. The company recently completed a 1½-mile east extension to the field, with the well flowing 490 bbl. of oil daily through choke from the Embar. This field will apparently be a large reserve as production is from Embar prior to acidizing, whereas production in Worland field, north of Slick Creek follows heavy acid treatment of the formation.

During the past several years the Sand Draw-Beaver Creek-Riverton area of Wyoming has been of interest to operators, following development of important oil reserves in the Tensleep formation in these three fields. Considerable geophysical work has been done by several operators and a few dry holes have resulted. This week Zack K. Brinkerdorff, Jr., of Casper announced location for another wildcat with the well in the C NW SE 17-1s-5e (WRM), Fremont County, northeast of Riverton and north of Sand Draw and Beaver Creek fields. Obligation to the Wind River Indians is for a 5,100-ft. test, which will probably test Mesa Grande. Tensleep would be expected to be below 10,000 ft. in the area, and testing of this formation is dependent upon results from the upper zones.

Sinclair Oil & Gas Co. made location for a wildcat in the South Meadow Creek area, 2 miles south of Meadow Creek unit, Wyoming, production. Brinkerdorf Drilling Co. of Casper made location for a wildcat in the South Sage Spring Creek area, C NE NW 21-36n-77w, 2 miles south of production in the field proper and north of production at Cole Creek field.

In Colorado, British-American Oil Producing Co. made location for another wildcat in Logan County, with the well in NE NE SW 7-8n-53w, Graylin area. Ryan Oil Co. is moving in material for 1 Miller, SW NE NW 14-8n-52w, in the Northwest Sterling area. Slick-Moorman Oil Co. announced location for 1 Ommen, NE NW SW 22-10n-52w, in the Padroni area, Logan County.

COLORADO SUCCESSFUL WILDCAT

Walker, Logan County: British-American 1 Green, NE NE SE 20-9n-53w, TD 5,475 ft., flowed 14 bbl. of oil, no water, in 16 hours, 7-in. csg. 5,348 ft., Pierre 856 ft., Niobrara 4,061 ft., Greenhorn 4,564 ft., Graneros 4,847 ft., "D" sand 4,847 ft.,

"J" sand 4,99 ft., gas sand 4,967 ft., Cloverly 5,225 ft., black oil 5,253-81 ft., "T" sand 5,370 ft., Morrison 5,414 ft.

COLORADO WILDCAT FAILURES

Kiowa: Elbert County: Cline, Nelson & Rivers 1 Gorton, NE SE NE 21-8s-62w, TD 7,508 ft., dry, Niobrara 6,410 ft., Greenhorn 6,972 ft., sand 7,266 ft., Dakota 7,385 ft.

Yuma Prospect, Yuma County: J. E. Manning 1 Siemers, SE SE SE 32-2n-48w, TD 4,120 ft., dry, Niobrara 2,803 ft., Timpas 3,324 ft., Carlile 3,296 ft., Greenhorn 3,453 ft., first sand 3,677 ft., Cloverly 3,977 ft., Morrison 4,107 ft.

MONTANA WILDCAT FAILURE

Midway, Pondera County: E. B. Emrick 1 State, NE NE SW 36-28n-2w, TD 1,960 ft., dry, Red Beds 1,310 ft., Sunburst 1,692 ft., Madison 1,952 ft.

NORTHERN NEW MEXICO SUCCESSFUL WILDCATS

Stoney Buttes, San Juan County: Southern Union 1 Navajo, SW NE NE 1-21n-14w, TD 3,644 ft., pumped 40 bbl. of oil per day, Dakota 3,554 ft.

El Huerfano: Stanolind and Slick-Moorman 2 Unit, C NW SE 25-26n-10w, TD 2,105 ft., PB 2,089 ft., 428,000 cu. ft. of gas per day, Pictured Cliffs 2,028 ft.

NORTHERN NEW MEXICO WILDCAT FAILURES

Southwest Lindrith, Sandoval County: Southern Union Gas 1 Jicarilla Tribe, NW SE NE 26-23n-4w, TD 2,772 ft., dry.

El Huerfano, San Juan County: Stanolind and Slick-Moorman 3 Unit, C SW NE 1-26n-10w, TD 2,425 ft., dry, Pictured Cliffs 2,307 ft.

NEBRASKA WILDCAT FAILURES

Banner County: British-American 1 Crantz, SW SW NW 28-18n-53w, TD 6,050, dry, Niobrara 4,626 ft., Fort Hays 4,830 ft., Carlile 4,938 ft., Greenhorn 5,091 ft., "D" sand 5,442 ft., "J" sand 5,576 ft., "M" sand 5,773 ft.

Furnas County: Superior Oil Co. 44-34 Ohlund, SE SE NW 34-2n-20w, TD 3,848 ft., dry.

Sheridan County: Superior Oil Co. 17-24 Murray, NW SW SW 24-32n-46w, TD 3,041 ft., dry.

South Louisiana

Lafourche Parish Strike Continues Testing

NEW ORLEANS.—Superior Oil Co.-Clovelly Corp. is still testing 1 Clovelly Corp., 33-18s-22e, Lafourche Parish, oil discovery. Latest gage by the firms was based on a 12-hour test through perforations at 12,305-15 ft. The well flowed 194 bbl. of oil daily through 7/64-in. choke. Gravity of the oil was 32.2°. The wildcat was initially tested through perforations at 12,346-60 ft. and recorded a flow of 170 bbl. of oil daily through ⅛-in. choke. Gravity of the oil was 23.9°. Location has been staked for a confirmation test to the discovery. The 2 Clovelly Corp., 33-18s-22e, is a southwest offset.

Final completion has been made at Roeser & Pendleton, Inc., 1 State Lease 1468, oil discovery in the Lake Maurepas sector of Livingston Parish. Through perforations at 9,813-50 ft., the well flowed 320 bbl. oil per day through 10/64-in. choke. Tubing pressure was 1,400 psi., and gravity of the oil was 47.8°.

A successful test has been made at Magnolia Petroleum Co. A-4 State Lease 694, the third producer in Block 126 field of the Eugene Island area off St. Mary Parish. Through perforations in the Miocene at 11,468-98 ft., the well flowed 699 bbl. of

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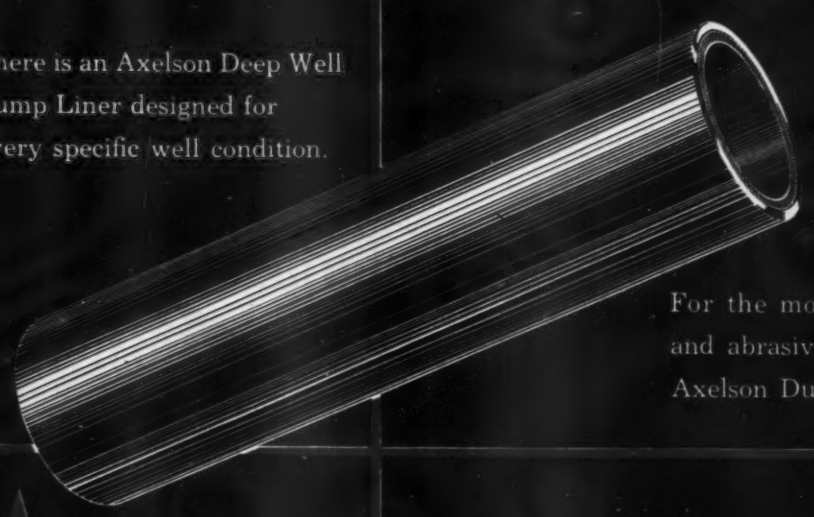

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35.5°-gravity oil daily through 14/64-in. choke. Hole is bottomed at 12,417 ft. This well, which is located approximately 25 miles off the Louisiana coast, is owned jointly by Magnolia, Continental Oil Co., and Newmont Oil Co.

Pan American Production Co. has staked location for a 15,000-ft. wildcat in Cameron Parish. The well is 1 Miami Corp., 4-15s-3w, and is approximately 2½ miles southeast of Pecan Lake field.

Another oil well has been added to Eugene Island-Block 32 field, St. Mary Parish. Pure Oil Co. A-3 State Lease 833 has been completed for 159 bbl. of 36.8°-gravity oil daily through 8/64-in. choke. Hole was drilled to total depth of 11,941 ft., plugged back to 9,705 ft., and redrilled to 11,513 ft. in side-tracked hole. Operator set 7-in. casing at 11,510 ft., and perforated for production test at 9,871-80 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Calcasieu Parish: Sun Oil Co. 1 Brooks, C NE SW 20-10s-12w, TD 11,002 ft., perf. 10,868-80 ft., 41 bbl. oil per day, ⅛-in. choke, TP 2,050 psi., CP 1,850 psi., gravity 45.3°.

Pointe Coupee Parish: New pay at Fordoche-The Texas Co. 1 State-Reno et al., unit 1, 37-5s-8e, TD 10,680 ft., perf. Sparta 10,420-36 ft., 132 bbl. oil per day, 8/64-in. choke, TP 1,910 psi., gravity 48.8°.

SOUTH LOUISIANA WILDCAT FAILURES

Avoyelles Parish: Gulf Refining Co. 4 Ben J. Altheimer estate, et al., 38-4n-3e, dry, TD 8,105 ft.

Cameron Parish: The Texas Co. 1 State-Comegys et al., unit 2, Umbrella Bay, dry, TD 12,505 ft.

Plaquemines Parish: California Co. 1 California Co. Helis estate-Harvey, 50-20s-30e, dry, TD 11,183 ft.

Pointe Coupee Parish; Bateman Drilling Co. 1 L. M. Major, 85-5s-10e, dry, TD 10,107 ft.

Texas Gulf Coast

Dual Completions Open New Pays

HOUSTON.—In the new South Durkee area of Harris County, Petrex Oil Corp. 1 Sadie H. Southard, George Green Survey, Abstract 281, has been completed in a new sand. Through tubing perforations in the Look sand at 7,196-7,204 ft., the well flowed 259 bbl. of 34-gravity oil per day through 9/64-in. choke. Tubing pressure was 825 psi. Through casing perforations in the Fairbanks sand, the original field pay, at 7,048-50 ft., the well flower 193 bbl. of 34.4°-gravity oil daily through 10/64-in. choke. Casing pressure was 700 psi. on the test.

In the same area, and immediately following Petrex's discovery, The Texas Co. 1 William Hubbell fee, H&TC RR Co. Survey, Section 12, A-1168, has been completed in the same sands. Through tubing perforations at 7,194-98 ft., the well flowed 195 bbl. of 34.3°-gravity oil daily with 900 psi. pressure on the tubing. Through casing perforations at 7,042-46 ft., it flowed 190 bbl. of 34.2°-gravity oil daily with 760 psi. casing pressure.

New pay has been opened in Long Point Dome area of Fort Bend County at Ralph B. Cantrell 1 Mary Pleak, H&TC RR Co. Survey, Section 102, Abstract 77. The well flowed 82 bbl. of oil daily through perforations at 5,531-37 ft. through ⅛-in. choke. Gravity of the oil was 24.3°. Tubing pressure was 360 psi. and casing pressure 700 psi. Total depth of the hole is 5,576 ft., with 5½-in. casing set at 5,476 ft.

One mile northwest of Wyrick field, Refugio County, Kirkwood & Morgan, Inc., 1 C. H. Dean has been completed as a dual gas discovery. Through casing perforations at 2,717-22 ft., the well flowed 125,000,000 cu. ft. of gas per day on open flow potential. It also made 7,500,000 cu. ft. per day through tubing perforations at 2,807-15 ft. The new producer was drilled to a total depth of 5,468 ft., and 5½-in. pipe was run to 2,885 ft. for completion. It is located in Jose Maria Gregoria Cobian Survey, approximately 1¼ miles northwest of La Rosa field.

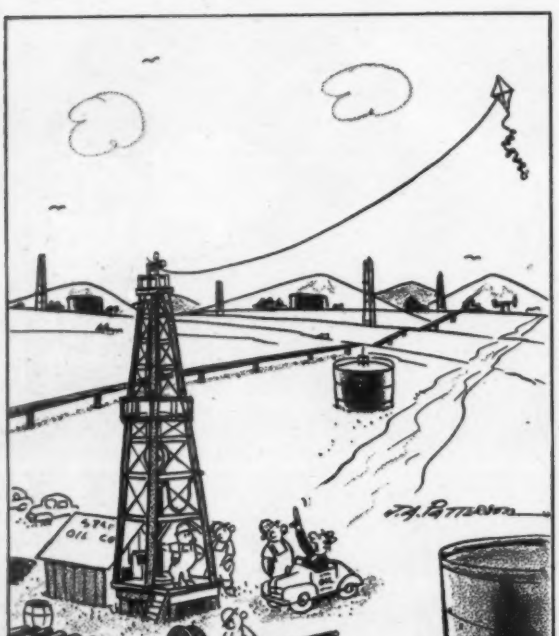
Annava Corp. is still testing its Grimes County wildcat, 1 Herbert Youens, J. B. McNealy Survey, 1½ miles northeast of Navasota. No details are being released on the well, but reports from the field are that the well is testing salt water and a small amount of 38°-gravity oil from an unreported depth.

Shell Oil Co. 1 George Musselman, wildcat between Helen Gohlke field of De Witt County and West Fordtran field of Victoria County, is ready for production test after setting 5½-in. casing. This well topped the Wilcox at 8,051 ft., and cored sand with shale streaks and oil odor at 8,051-57 ft., sand with oil odor at 8,057-76 ft., a shale break at 8,076-78 ft., and sand with oil odor and color at 8,078-9,105 ft. While it is probable that the upper portion of the zone contains gas, it is believed that the lower portion has oil saturation. This well is considered a link between the two fields, both of which produce from the Wilcox below 8,100 ft. The 1 Musselman is located in IRR Co. Survey 5, Abstract 206, just southeast of Helen Gohlke production and approximately 8,900 ft. west-southwest of Kirby 1 Buchanan, oil discovery for West Fordtran.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Bee County: The Texas Co. 1 Sallie Ragsdale, A. J. Davis Sur. A-155, TD 10,468 ft., perf. Wilcox 8,068-72 ft., 15 bbl. oil per day plus 706,000 cu. ft. of gas, gravity 38°, ¼-in. choke.

Goliad County: New gas pay at Berclair—Renwar Oil Corp. et al., 1 McCoy trt., T. Simons Sur. A-292, and Sampson McTornall Sur. A-195, TD 3,574 ft., perf.



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2,203-05 ft., 2,200,000 cu. ft. of gas per day, open flow, TP 430 psi.

Liberty County: New pay at Esperson Dome—General Crude Oil Co. C-1 Esperson, Geo. L. Pace Sur., TD 11,694 ft., perf. 8,911-15 ft., 14,000,000 cu. ft. of gas per day, open flow, ¼-in. choke, 2,775,000 cu. ft. of gas plus 40 bbl. 58.2°-gravity condensate.

Montgomery County: PLD Well Service Co. 1 Wood et al., William Weir Sur., 6½ mi. NW Willis, TD 3,806 ft., perf. 3,700-38 ft., flowed gas and spray of condensate 3/16-in. choke, no gage.

PLD Well Service Co. 1 Snow et al., William Weir Sur., 3½ mi. NW Willis, TD 3,752 ft., perf. 3,731-38 ft., no gage.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Austin County: The Texas Co. 1 Marek, Frederick Ernst Sur., dry, TD 10,959 ft.

(Continued on page 175)

Mississippi

Jackson Dome Test Recovers Oil Show

JACKSON.—On the north flank of the Jackson dome in southern Madison County, Carter Oil Co. 1 G. L. Crawford, 7-7n-2e, cored and drill-stem tested a show of oil in the top of the gas rock section. Top of the zone was picked at 3,696 ft. First core at 3,700-15 ft., with the lower 5 ft. being fractured, showed dense limestone with good stain and odor. On a 30-minute drill-stem test, using ¼-in. top and bottom chokes, and 390-ft. water cushion, recovery was 30 ft. of 23°-gravity oil and 60 ft. of salt water cut with mud. Another drill-stem test was run at 3,715-25 ft., with recovery being 150 ft. of oil cut with salt water and mud. Operator is now coring at 3,847 ft.

In West Lincoln field, Lincoln County, Roeser & Pendleton 1 H. J. Grice est., SE NE 22-6n-6e, west offset to the field discovery, has been completed for 100 bbl. of oil through 10/64-in. choke. The well is flowing through perforations at 10,651-77 ft. in the lower Tuscaloosa "stringer" sand. This flow was somewhat disappointing since the well flowed approximately 8 bbl. per hour on drill-stem test of this section. Nineteen feet of effective sand were indicated by electric log. There is a possibility that the flow may increase when the well is thoroughly cleaned.

On the west side of Tinsley field, Yazoo County, Union Producing Co.-Jones-O'Brien 1 Logan, 23-10n-3w, projected Smackover test, at last report had cored to 13,251 ft. (—13,001 ft.) without encountering top of Smackover. Recovery from core at 13,241-51 ft was red, tight, silty sand. Operators will continue coring.

Another Smackover wildcat, Continental Oil Co. 1 John R. Cameron, 36-10n-1e, Madison County, is drilling at 13,376 ft. Top of the Cotton Valley was picked at 11,070 ft.

Northwest of Kosciusko, Attala County, Justiss-Mears 1 Bingham, 4-16n-6e, started coring at 1,963 ft. First core at 1,963-84 ft. recovered 21 ft. of hard shale. Second core at 1,984-2,064 ft. recovered hard tight chalk with no shows. Latest available report is that operators are reaming down to total depth of 2,150 ft. preparing to core ahead. This wildcat is located on the same 40 acres where Hunt Oil Co. drilled 1 D. J. Murphy in 1943. Shows of oil were reported in the 1 Murphy.

MISSISSIPPI WILDCAT FAILURES

Clarke County: C. G. Norsworthy, J.-Lyle Cashion Co. 1 A. R. McNeill et al, 7-2n-15e, dry, TD 5,705 ft.

Wilkinson County: Austin E. Stewart 1 Bell Cory, 24-3n-1e, dry, TD 8,220 ft.

Canadian Fields

Manitoba Discovery Area Gets Successful Follow-up

CALGARY.—California-Standard Co. is now swabbing its second Virden, Manitoba, well following extended shooting and acidizing, and should be able to determine potentialities of the well in another few days. The venture Daly 10-18, in LSD 10, 18-10-27w4, ¼ mile south of the Virden discovery. Prior to the final acidizing, it developed a small potential of 8-9 bbl. daily of oil on swabbing tests, with no sign of formation water. Cal-Standard hopes it will do better when the acid load has been cleared from the formation.

After halting drilling at 2,234 ft. and setting casing at top of the limestone pay section, the Daly follow-up was selectively acidized with 2,000 gal. After the formation had been swabbed, it was then shot with nitroglycerin, followed up by 11,500 gal. of acid. Swabbing is now in progress to clear the formation, with current hourly yield of about 8 bbl. of fluid, including about 50 per cent acid water.

The Daly 15-18 discovery well, which plugged back to the pay zone and apparently has formation water coming in from the base, is now pumping fluid consisting of 35-40 per cent crude oil and 60-65 per cent formation water. The net oil recovery is 8-10 bbl. daily.

Canadian Gulf Oil Co. received a substantial natural-gas flow in the basal quartz sand at its initial venture on a quarter section of Crown Reserve Lease in the Golden Spike area. The drill-stem test yielding the gas rated a maximum flow rate estimated at 3,000,000 cu. ft. daily.

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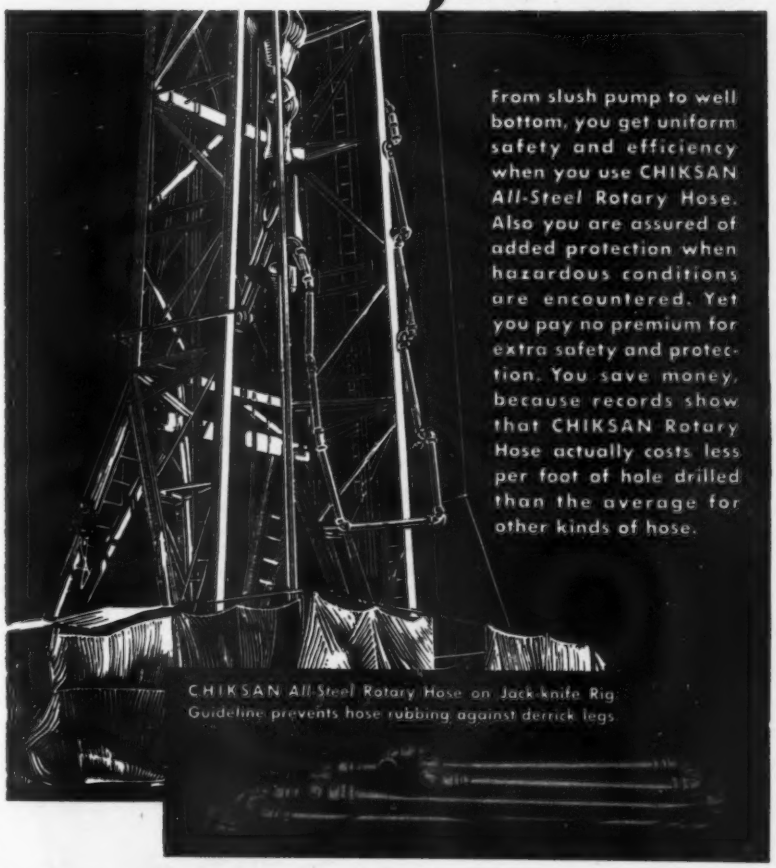

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The gas flow was obtained at Golden Spike 2, in LSD 2, 34-51-27w4, ½ mile north of Imperial's Golden Spike Devonian oil production. A 1-hour drill-stem test from 4,338-46 ft., gave a flow of natural gas to the surface in 4 minutes, with a 2,000,000-cu. ft. daily rate in 15 minutes, building up to estimated maximum 3,000,000 cu. ft. per day. When pipe was pulled, it was found to contain 10 ft. of drilling mud, no water. The hole is now heading for its Devonian objectives.

The Oliver Lake wildcat which yielded a natural-gas discovery in top of the Viking sand section last week has failed to find oil, gas, or water in the deeper sections of the horizon, and is now heading for its basal Cretaceous and Devonian objectives. The well, Leduc-Calmar-Western Properties-Oliver Lake 1, is in LSD 1, 4-50-21w4, about 4 miles southeast of Joseph Lake Viking oil and gas field, and around 15 miles north of the Anglo-Home-C. & E.-Camrose Viking oil discovery well.

The Oliver Lake well topped the Viking at 3,171 ft., and ran the first drill-stem test at 3,186 ft., resulting in a natural-gas flow of 3,000,000 cu. ft. daily, with no oil or water. A second test, at 3,189-3,203 ft., gave a slight air blow plus 90 ft. of mud in 1 hour.

CANADIAN SUCCESSFUL WILDCATS

Anglo-Home-C. & E.-Camrose 3, LSD 14, 29-47-20w4, TD 5,189 ft., 70 bbl. of oil daily on pump.

Delhi-Socony-Link Lake 1, LSD 8, 34-32-17w4, TD 4,325 ft., 5,500,000 cu. ft. of gas daily.

CANADIAN WILDCAT FAILURES

Cal-Standard-Baptiste Lake 1, LSD 6, 16-66-24w4, TD 4,825 ft.

British Dominion-Millet 1, LSD 8, 12-48-25w4, TD 6,210 ft.

Lingnora-Redwater 1, LSD 3, 1-56-22w4, TD 4,335 ft.

Warner-Socony-Stonelaw 1, LSD 13, 13-33-19w4, TD 5,550 ft.

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Address _____

City _____ *Zone* _____ *State* _____

Illinois-Ind.-Ky.

McClosky Pool Indicated By Lamott Area Wildcat

CALVERT DRILLING, INC., and C. L. McMahon, Inc., appear to have discovered a new McClosky lime pool in the Lamott area, 5 miles southeast of Mount Vernon, southern Posey County, Indiana. Their 1 Keck Heirs, SE NW NE 18-7s-12w, the prospective discovery well, logged good saturation in that pay zone at 2,688-96 ft., and has oil string run to 2,670 ft. for completion. A drill-stem test of the zone below 2,672 ft. got a substantial gas flow, starting within 5 minutes after the tester was opened, and yielded 1,620 ft. of clean oil and 30 ft. of oil-cut mud in the breakdown. Tester was open 60 minutes. Indicated bottom-hole pressure was 990 psi. No water showed. The well is only ¾ mile northeast of production in the Lamott area, but is 2 miles from nearest McClosky wells.

McClosky production also is being opened in the new pool discovered by Gulf Refining Co. in the area northeast of the Frogtown pool, 6 miles northwest of Carlyle, in Clinton County, Illinois. Gulf's discovery well, 1 Warnecke, NE NE NW 6-2n-3w, indicated this production but was deepened to the Devonian, where it was completed. The McClosky pay is being opened by W. C. McBride in his 1 Schroeder, SE SE SW Fractional Section 31-3n-3w, a north offset to the Gulf Devonian well. The McBride well logged the McClosky saturation at 1,207-17 ft. with bottom of the hole still in the pay. On tests before acidization, it flowed 188 bbl. of oil with an estimated 2,500,000 cu. ft. of gas per day. Gulf's Devonian discovery well flowed 15 bbl. of oil with 1,500,000 cu. ft. of gas per day at completion. Its pay is at 2,170-2,217 ft. McClosky production in this pool is the most westerly of any consequence in the Illinois Basin area. Nearest other production from that horizon is in the Salem pool, 25 miles to the east.

What is believed to be Silurian production also is indicated for the pool in a well located about ¾ mile southwest of the Gulf discovery well. That well, E. J. Goldsmidt and H. F. Robison 1 Jaske, NEc SE 1-2n-4w, now in process of completion, swabbed and flowed at the rate of 128 bbl. of oil per day on preliminary tests. Its pay zone is at 2,259-80 ft., slightly below that in the Gulf well.

Many operators in the Illinois Basin area, including a number of wildcats which have indicated the opening of new production, continue to be shut down because of flooded or otherwise inaccessible locations.

ILLINOIS SUCCESSFUL WILDCAT

Clinton County: Gulf Refining Co. 1 Warnecke, NE NE NW 6-2n-3w, IP 15 bbl. oil and 1,500,000 cu. ft. gas, Devonian 2,171-2,217 ft., TD 2,340 ft. (opens new pool).

ILLINOIS WILDCAT FAILURE

Macon County: Columbus Exploration Co. 1 Riley, SW NW NE 21-15n-2e, dry, TD 1,400 ft.

INDIANA SUCCESSFUL WILDCAT

Daviess County: Morgan Coal Co. 1 Sims, SE SE NW 35-5n-6w, IP 30 bbl., Salem 1,021-27 ft., TD 1,096 ft. (extension Elnora pool).

INDIANA WILDCAT FAILURES

Daviess County: L. L. Chevalier 1 Rusher, SW NE NW 34-5n-6w, dry, TD 1,985 ft.

Jackson County: Albert Sievers 1 Tate, NWc SE SW NW 32-6n-5e, dry, TD 383 ft.

Knox County: George & Wrather 1 Hill, NE NE NE Militia Donation 198-4n-9w, dry, TD 1,655 ft.

Vanderburgh County: John Coombs 1 Elliott, SE SE SE 36-4s-10w, dry, TD 2,184 ft.

(Continued on page 175)

Appalachian-Ohio

Exploration Announced For Sullivan County, Pa.

PITTSBURGH.—A rank wildcat has been started by California Co. in Davidson Township, Sullivan County, northeastern Pennsylvania. The 1 Arthur W. Bennett, elevation 1,479 ft., is on the Eagles Mere Quadrangle. Three new locations have been announced in active Leidy Township, Clinton County, on the Hammersley Fork Quadrangle: Noyly Development Co. 1 Charles Cross; New York State Natural Gas Corp. N-2-228 R. W. Daugherty, and N-1-231 Lea McCoy.

In southwestern Pennsylvania, Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-3921 Fred Musnug, elevation 2,100 ft., is now running 7-in. casing.

Maryland.—In the Mountain Lake Park section, Garrett County, rig is being moved in at Blaho Oil & Gas Co. 1 C. L. Richards. Eberly & Snee 1 Virginia E. Baker, elevation 2,415 ft., is drilling at 3,373 ft. The Oriskany sand was found at 3,222-3,309 ft. The well tested 21,000 cu. ft. of gas at 3,246 ft. The same operators' 1 Gordon, elevation 2,464 ft., is shut down at 4,031 ft. to acidize. The bottom of the Oriskany sand was reached at 3,950 ft.

West Virginia.—In Portland district, Preston County, Eberly & Snee 1 S. F. Calvert, elevation 2,180 ft., previously reported shut down at a depth of 5,265 ft. with 1,800,000 cu. ft. of gas, was drilled deeper in the chert and encountered additional gas at

(Continued on page 175)

Louisiana-Arkansas

Dual Completion for Simsboro Field

SHREVEPORT. — Formal completion of new-pay discovery for Simsboro field in Lincoln Parish is reported with the dual completion of Murphy & Co. and Pan-Am Southern Corp. 1 Givens, 1,410 ft. south and 1,310 ft. east of northwest corner 11-17n-4w. The well made 6,650,000 cu. ft. of gas from James lime at 5,714-26 ft. and 1,975,000 cu. ft. from pay at 6,528-48 ft. in Gardner sand which is the regular pay in the field. Well was drilled to a total depth of 10,100 ft.

Final completion data for the new Pettit pay in Caddo-Pine Island field, Gulf Refining Co. 279-N Caddo Levee Board showed open-flow gas production of 10,000,000 cu. ft. plus 14 bbl. of distillate per million cubic feet. Pay is at 4,976-88 ft. Well is located 702 ft. south and 1,542 ft. east of northwest corner of southwest quarter 11-20n-16w.

In Bossier Parish, Skelly Oil Co. finished its 1 Ledbetter, 7-18n-11w, as dry at 5,750 ft. Cores in the Travis Peak below 5,500 ft. failed to give any encouragement, and there was no promise of production in the Pettit limestone.

In Arkansas, Carter Oil Co. will drill a 10,200-ft. Smackover test in Section 29-19s-20w, Columbia County. The wildcat, 1 McMertise School, is spotted 2 miles south of Emerson and 2½ miles northwest of Pettit production in the Arkansas portion of Haynesville field.

NORTH LOUISIANA SUCCESSFUL WILDCATS

Caddo Parish: New pay in Caddo-Pine Island field—Gulf Refining Co. 279-N Caddo Levee Board, 702 ft. S and 1,542 ft. E NWc SW/4 11-20n-16w, open flow 10,000,000 cu. ft. of gas plus 14 bbl. of distillate per million cubic feet from Pettit at 4,976-88 ft., TD 7,993 ft., Arkadelphia 700 ft., Nacatoch 812 ft., Saratoga 1,158 ft., base Annona 1,533 ft., base Ozan 1,615 ft., Tokio 1,654 ft., Blossom 1,789 ft., Paluxy 2,130 ft., anhydrite 3,514 ft., Massive anhydrite 3,792 ft., base Massive anhydrite 4,040 ft., James 4,580 ft., Travis Peak 5,213 ft., Cotton Valley 7,110 ft., elev. 193 ft.

Lincoln Parish: New pay (James) in Simsboro field—Murphy & Co., and Pan-Am Southern Corp. 1 Givens, 1,410 ft. S and 1,310 ft. E NWc 11-17n-4w, dual comp.: 6,650,000 cu. ft. gas from James at 5,714-26 ft., and 1,975,000 cu. ft. from Gardner sand (regular pay) at 6,528-48 ft., TD 10,100 ft., Massive anhydrite 4,888 ft., base Massive anhydrite 5,118 ft., Fowler sand 5,284 ft., Travis Peak 6,410 ft., Cotton Valley 9,302 ft., Bodcaw 9,691 ft., Vaughn 9,861 ft., elev. 340 ft.

NORTH LOUISIANA WILDCAT FAILURES

Caddo Parish: Plymouth Oil Co. 1 Webb, 860 ft. N and 660 ft. E SWc 4-16n-13w, dry, TD 4,840 ft., Nacatoch 896 ft., base Annona 1,570 ft., Tokio 1,966 ft., anhydrite 3,656 ft., Massive anhydrite 4,354 ft., base Massive anhydrite 4,610 ft.

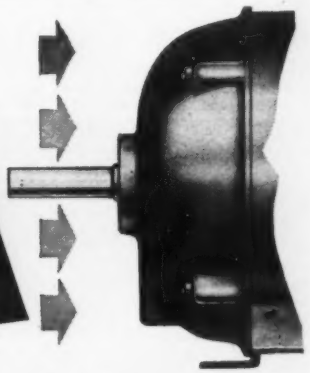
Concordia Parish: Sunnyland Contracting Co. 1 Forrest-Moro Plantation, 51° 35′ S and 2,050 ft. W NEc 20-6n-9e, dry, TD 7,045 ft., Cook Mountain 2,792 ft., Sparta 3,053 ft., Cane River 3,840 ft., Tallahatta 4,190 ft., Wilcox 4,286 ft., base Big shale 5,597 ft.

De Soto Parish: F. L. Collier et al., 1 Peek, 990 ft. S and 1,030 ft. W NEc 25-11n-13w, dry, TD 3,100 ft., no tops reported.

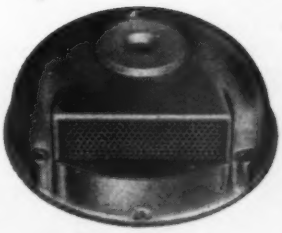
ARKANSAS WILDCAT FAILURE

Columbia County: Gulf Refining Co. and Chicago Corp. 1 Pittman, 330 ft. S and 669 ft. E NWc 9-17s-20w, dry, TD 8,018 ft., Arkadelphia 1,753 ft., Nacatoch 1,863 ft., Saratoga 2,175 ft., base Annona 2,482 ft., Eagleford 3,008 ft., Massive anhydrite 3,304 ft., base Massive anhydrite 3,455 ft., Gloyd 3,745 ft., James 4,024 ft., Travis Peak 4,410 ft., Cotton Valley 5,575 ft., Buckner 7,605 ft., Smackover 7,685 ft.

HERE'S *Full-Height* MOTOR PROTECTION

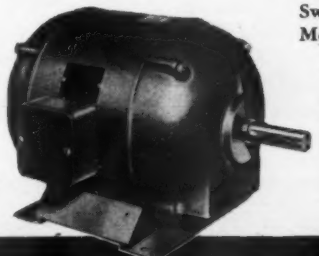


Shrouded End-Heads give R&M Motors Better Performance, Lower Maintenance



● The *extra protection* of R & M end-heads is a "plus" all users appreciate, for—like R & M Weatherizing—it guards internal motor parts against damage by the elements. You'll often find standard R & M Motors outdoors, without a cover, because standard R & M shrouded end-heads are *tops* in drip-proof construction.

OPENINGS ARE SCREENED. An *added* refinement now on R & M Motors is the screening of end-head openings. This excludes rodents attracted by warmth, and keeps air-borne debris from hampering the high-velocity end-to-end "Clean Sweep" ventilation. Capable, durable R & M Motors *stay* internally clean and cool-running.



THOUSANDS IN USE. R & M Motors have rigid one-piece steel shells, fully sealed prelubricated ball bearings, insulation you can trust. Sizes to 50 h.p. All types. Ask your contractor or *any user*, or write for Bulletin O-400-G.

R&M *All-Weather Oil Country* MOTORS

ROBBINS & MYERS, INC., Motor Div., SPRINGFIELD 99, OHIO • BRANTFORD, ONT.

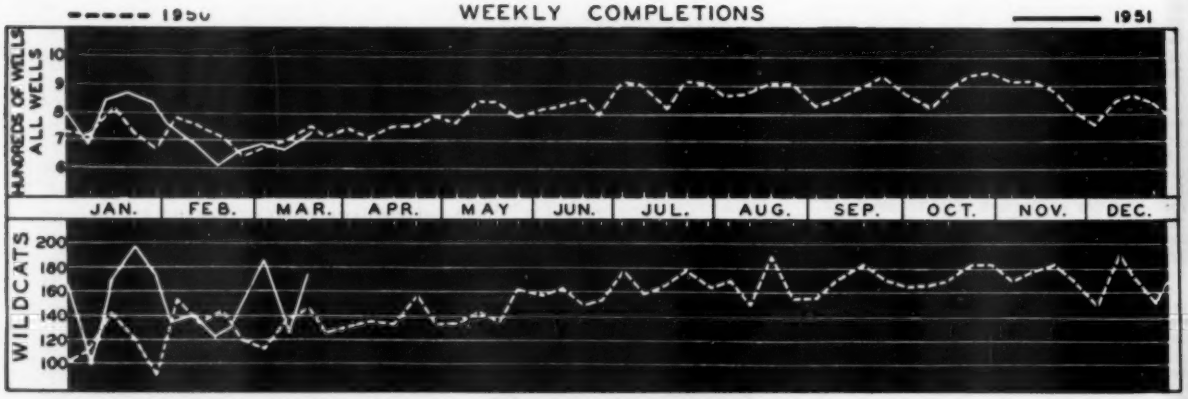
CURRENT STATISTICS

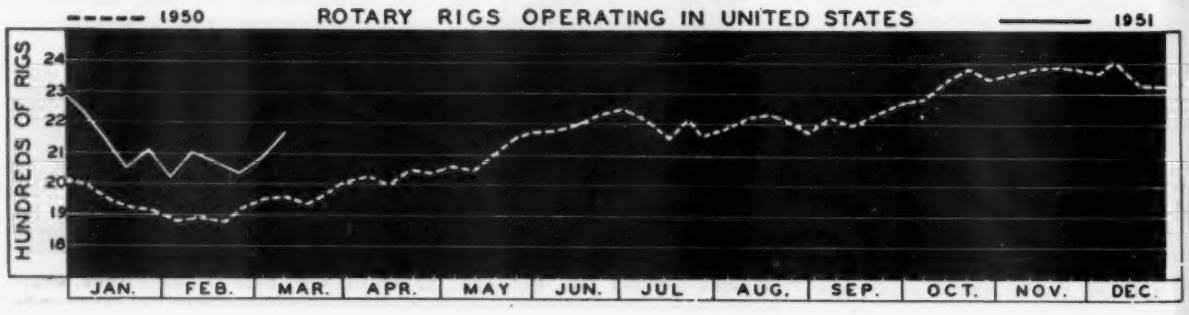
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . .WEEK ENDED MARCH 17, 1951

	Total of all wells					Mar. 17		Wildcat completions and discoveries						Cumulative total, 1951				
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total		Oil	Dist.	Gas	Dry	Total
New York	8	4	0	*4	11,648	81	127	0	0	0	0	0		0	0	0	0	0
Pennsylvania	12	6	1	†5	21,430	160	229	0	0	0	0	0		0	0	0	1	1
West Virginia	13	4	6	3	31,716	129	133	0	0	0	0	0		0	0	3	2	5
Ohio	5	3	1	1	16,203	150	185	0	0	0	0	0		1	0	2	5	8
Indiana	13	1	1	11	22,412	203	211	1	0	0	4	5		4	0	1	47	52
Kentucky	19	11	0	8	25,585	161	168	0	0	0	5	5		2	0	0	24	26
Illinois	11	5	0	6	26,070	359	435	1	0	0	1	2		10	0	0	52	62
Michigan	14	5	1	8	39,237	134	160	2	0	0	4	6		3	0	2	52	57
Kansas	65	35	3	27	214,671	829	682	5	0	0	10	15		35	0	2	149	186
Nebraska	6	1	0	5	24,151	63	15	0	0	0	5	5		2	0	1	29	33
Oklahoma	107	62	7	‡38	401,777	1,114	999	3	0	1	20	24		44	0	6	140	190
Texas	296	166	12	118	1,319,420	3,302	3,249	13	1	3	63	80		127	14	19	586	745
North Central (Dist. 7-B & 9)	86	33	2	51	257,882	966	975	5	0	0	27	32		59	0	1	230	290
West (Dist. 7-C & 8)	89	68	0	21	449,942	1,015	962	3	0	0	10	13		29	2	0	123	154
Panhandle (Dist. 10)	12	7	5	0	32,289	154	241	0	0	0	0	0		0	0	0	5	5
Eastern (Dist. 5, 6, & 6-P)	14	10	0	4	72,805	223	228	0	0	0	2	2		0	0	0	44	44
Gulf Coast (Dist. 2 & 3)	49	24	4	21	311,222	473	437	2	1	3	12	18		22	8	15	86	131
Southwest (Dist. 1 & 4)	46	24	1	21	195,280	471	406	3	0	0	12	15		17	4	3	98	122
Louisiana	48	29	5	14	340,028	428	500	2	0	2	7	11		13	0	3	58	74
Northern	22	13	5	4	91,120	198	257	0	0	2	3	5		3	0	2	29	34
Southern	26	16	0	10	248,908	230	243	2	0	0	4	6		10	0	1	29	40
Arkansas	4	3	0	1	18,969	76	72	0	0	0	1	1		1	0	0	11	12
Mississippi	6	3	0	3	43,454	49	62	0	0	0	2	2		3	1	0	19	23
Southeastern States	0	0	0	0	0	13	13	0	0	0	0	0		0	0	0	2	2
Montana	9	7	0	2	18,667	33	29	0	0	0	1	1		0	0	0	3	3
Wyoming	15	11	1	3	86,955	134	124	0	0	0	0	0		3	0	0	20	23
Colorado-Utah	7	4	1	2	36,336	53	17	1	0	0	2	3		2	0	0	28	30
New Mexico	28	9	13	6	102,652	151	147	1	0	1	2	4		3	0	5	15	23
California	45	32	3	10	193,358	398	366	1	0	0	9	10		8	0	1	82	91
Miscellaneous	0	0	0	0	0	8	2	0	0	0	0	0		0	0	3	5	8
Total United States	731	401	55	275	2,994,739	8,028	7,925	30	1	7	136	174		261	15	48	1,330	1,654
Total previous week	667	385	30	252	2,764,806	....	....	17	1	1	107	126		231	14	41	1,194	1,480
Total March 17, 1950	754	416	51	287	2,828,546	....	....	18	2	2	123	145		198	16	49	1,157	1,420

Service wells included: *4, †5, ‡3.





DAILY AVERAGE PRODUCTION FOR WEEK

	Mar. 17 crude oil	B. of M. Mar. demand	Mar. 10 crude oil
Alabama	3,250	2,400	3,100
Arkansas	78,900	88,000	80,500
California	966,300	970,000	965,500
Colorado	78,600	78,000	78,000
Eastern	63,700	66,000	63,525
Florida	1,625	1,600	1,575
Illinois	163,900	166,000	165,300
Indiana	26,600	31,000	27,100
Kansas	316,800	306,000	311,650
Kentucky	28,600	31,000	28,700
Louisiana	603,750	632,000	613,350
North Louisiana	113,750		117,350
South Louisiana	496,000		496,000
Michigan	39,100	45,000	38,900
Mississippi	100,400	114,000	101,950
Montana	24,000	23,000	23,100
Nebraska	10,200	8,000	10,000
New Mexico	141,000	140,000	141,000
Oklahoma	498,800	495,000	504,500
Texas	2,616,550	2,460,000	2,616,550
Dist. 1 (Southwest)	32,975		32,975
Dist. 2 (Southwest)	157,100		157,100
Dist. 4 (Southwest)	244,150		244,150
Dist. 3 (Gulf Coast)	463,900		463,900
Dist. 5 (Eastern)	48,650		48,650
Dist. 6 (Eastern)	105,725		105,725
East Texas field	271,000		271,000
Dist. 7-C (West)	84,950		84,950
Dist. 8 (West)	892,500		892,500
Dist. 7-B (W. Central)	79,200		79,200
Dist. 9 (N. Central)	147,400		147,400
Dist. 10 (Panhandle)	89,000		89,000
Utah	3,800	5,000	3,400
Wyoming	193,300	183,000	190,500
Total United States	*5,965,175	5,845,000	5,968,300
Change from prev. week, down	3,125		
Canada	94,785		76,570

Total U. S. production January 1-March 17 .... †460,060,615 bbl.
Same period last year (crude plus cond.) ..... 375,730,535 bbl.

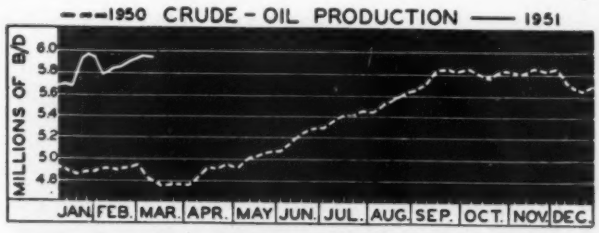
*Not including 108,700 bbl. condensate. †Including 8,021,160 bbl. condensate.

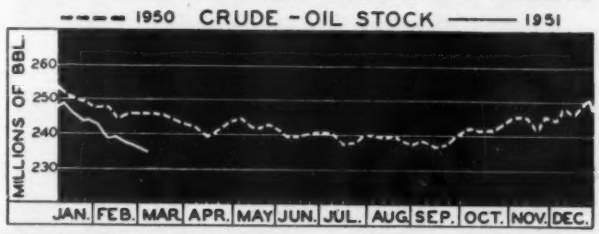
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

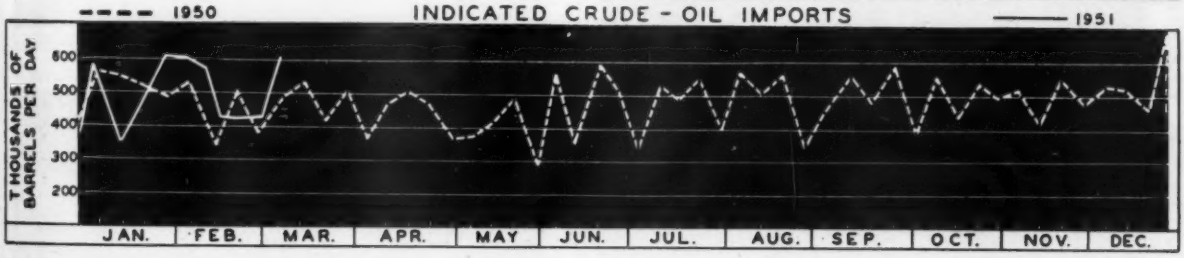
(Thousands of barrels)

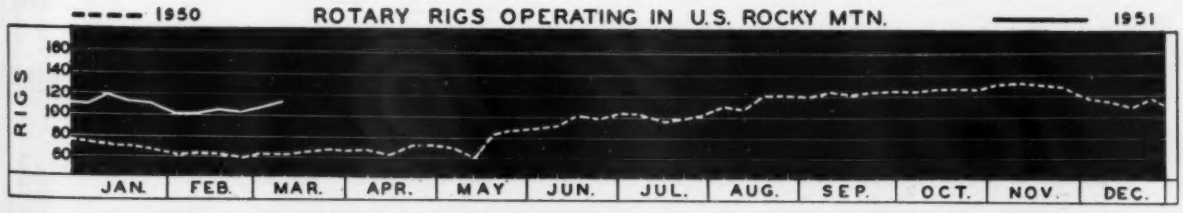
	Mar. 10, 1951	Mar. 3, 1951	Mar. 11, 1950
Pennsylvania Grade	2,104	2,031	2,691
Other Appalachian	1,268	1,284	1,588
Illinois, Indiana, Michigan	8,811	9,327	10,894
Arkansas	2,325	2,676	3,192
Louisiana	14,340	14,247	16,191
North	2,934	3,132	3,912
Gulf	11,406	11,115	12,279
Mississippi	2,896	3,029	2,609
New Mexico	6,879	6,975	6,945
Oklahoma and Kansas	37,353	37,810	35,197
Texas	109,743	110,735	107,383
East Texas	13,900	14,247	14,727
West Texas	43,703	43,654	37,117
Texas Gulf	24,750	25,294	29,400
Other Texas	27,390	27,590	26,139
Rocky Mountain	12,280	12,496	13,621
California	30,220	30,459	37,966
Foreign	6,320	5,649	7,425
Total	234,539	236,808	245,702

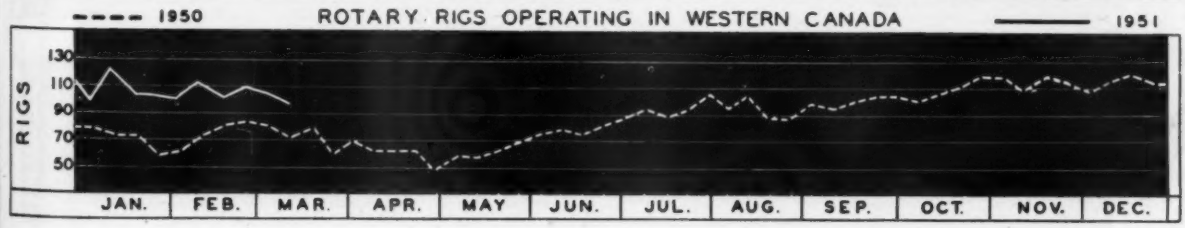
*Bureau of Mines.









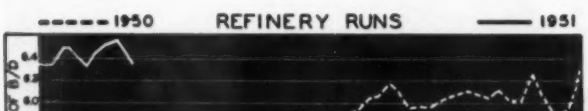


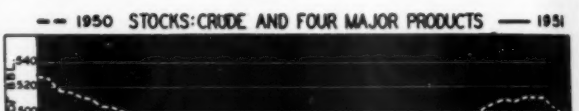
A.P.I. REFINERY REPORT, MARCH 10

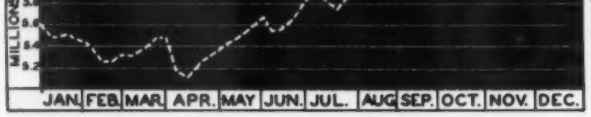
(Thousands of barrels)

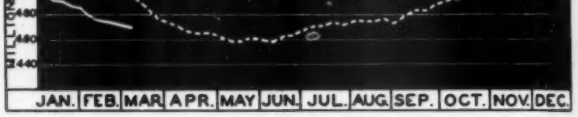
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, March 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	963	382.1	45.1	244.9	231.7	26,479	5,313	13,239	8,269	810	330.6	30.2	182.6	204.3
Appalachian:														
District 1	97	36.6	6.7	13.4	13.7	2,769	194	540	244	91	40.1	7.6	13.3	10.4
District 2	88	33.4	6.1	9.6	15.4	1,217	78	124	113	69	29.9	4.5	11.3	18.3
Ind., Ill., Ky.	1,250	613.7	80.9	251.6	207.6	31,362	2,829	7,007	3,142	1,032	526.8	67.4	169.2	191.9
Okla., Kans., Mo.	524	282.7	14.8	132.0	75.6	15,331	519	5,764	1,056	426	235.8	18.2	89.4	54.4
Inland Texas	224	142.7	14.0	34.4	42.3	4,372	295	540	765	199	141.2	11.0	26.7	44.1
Texas Gulf Coast	1,524	659.2	130.6	359.4	292.9	23,146	1,466	5,935	4,488	1,234	579.0	102.6	209.4	216.9
La. Gulf Coast	485	218.0	71.7	106.4	60.7	9,176	1,116	2,073	2,126	431	209.3	56.6	92.7	50.3
N. La. and Ark.	75	27.6	7.3	18.0	7.3	2,469	246	1,053	75	64	25.8	6.8	12.8	13.6
Rocky Mountain:														
New Mexico	12	6.0	.....	2.3	2.3	106	25	62	28	12	6.3	.4	1.9	2.9
Other Rocky Mtn.	208	98.1	6.3	36.3	42.1	5,488	236	1,260	679	170	79.5	6.1	32.0	35.7
California	916	409.6	6.7	113.0	365.4	17,141	485	8,425	17,239	798	334.5	14.4	96.4	311.0
March 10, 1951	6,366	2,909.7	390.0	1,321.3	1,357.0	139,056	12,802	46,022	38,224	5,336	2,538.8	325.8	937.7	1,153.3
March 3, 1951	6,596	2,927.0	434.7	1,388.1	1,375.7	138,209	12,794	47,560	38,068	.....	.....	.....	.....	.....
March 11, 1950	5,314	2,515.4	347.0	892.9	1,172.9	135,284	14,407	46,575	44,544	.....	.....	.....	.....	.....

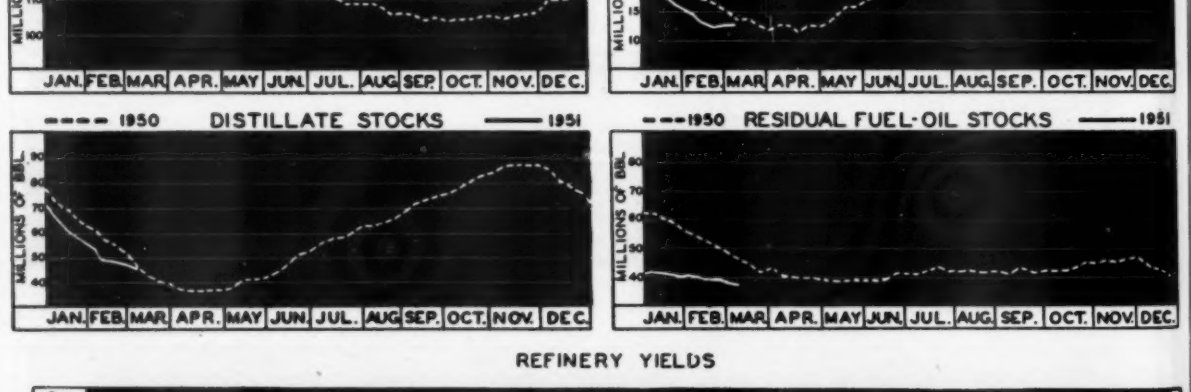
*At refineries including natural blended. †Finished and unfinished.











CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.93	....	....	....
19-19.9	1.98	....	....	....
20-20.9	2.03	$2.25	....	$2.12
21-21.9	2.07	2.27	....	2.14
22-22.9	2.12	2.29	....	2.16
23-23.9	2.18	2.31	....	2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

SOME refiners, having passed the peak of the heating season with only a few periods of tight supply, are being reminded that plans for another heating season will have to be made at a time when they are completing programs to meet new record demands for gasoline this summer. These reminders are in the form of inquiries from resellers about contracts covering requirements for home-heating fuel next winter. Since these inquiries are about 2 months ahead of normal contract season, they indicate that at least some secondary suppliers and resellers are anxious to establish firm sources of supply for another record heating season.

About the only indication of any decrease in demand for heavy fuel in the Mid-Continent area is in the attention given to specifications regarding sulfur content. More buyers are asking for low-sulfur residual in contrast with January requests for any kind of heavy fuel. However, most suppliers are expecting a relatively firm market throughout the summer with many large consumers filling all available storage. Refinery runs in the last quarter of the year will be no greater than the near-capacity runs in the first quarter, and the present price is no incentive to increase percentage yields of rsidual. Unlss primary stocks of residual can be increased during the summer months, next winter may bring another mad scramble for heavy fuel.

Restricted availability of lead for gasoline may produce a wider range in gasoline prices in the early part of the season. At the present, lower-octane gasolines are still a little soft while higher-octane grades are scarce on the open market. This spread will be cut if total gasoline supplies are tight in the last half of the season.

Demand for gasoline is averaging between 10 and 15 per cent more than at this time last year. Suppliers are expecting new summer records.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of March 19, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅛-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11⅛-11½	13.5-13.75	11½-12
42-44 w.w. kerosine	9¼-9⅜	10-10.1	8¾-9
No. 2 straw fuel oil	8⅜-8⅝	9-9.25	7¾-8
No 6 residual	$1.80-1.90	$2.25-2.30	$1.75-1.90

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅜	5⅞	6⅛
Grade 18-55	7.65	7.15	7.40

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

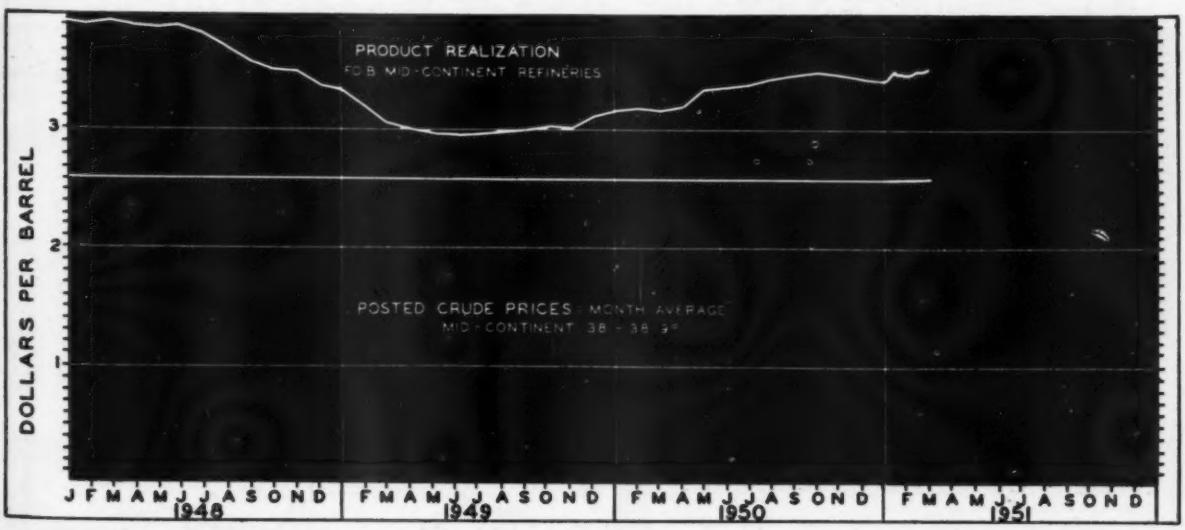
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	6.9


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES - MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.54 for week ended March 10, $3.52 for previous week, and $3.22 for March 1950.

North Central Texas

(Continued from page 153)

Foard County: British-American Oil Producing Co. 1 J. H. Johnson, 5-O-H&GN, 20 mi. SE Crowell, dry, TD 6,581 ft., elev. 1,575 ft., Caddo 5,780 ft., Mississippian 6,070 ft.

Jack County: American Republics Corp. 1 Paul Donald, N. M. Favor Sur., 3½ mi. SE Post Oak, dry, TD 6,972 ft., elev. 1,132 ft., Caddo 5,570 ft., Ellenburger 6,450 ft.

Jones County: W. H. Bryant 1 A. Williford est., Austin & Williams Sur., 2 mi. N Radium, dry, TD 3,257 ft., elev. 1,679 ft., Flippen 2,650 ft., Gunsight 3,104 ft., Swastika 3,178 ft.

Mills County: Colonial Crude, Inc., 1 W. L. Clarke, Nacogdoches University Sur. 298, 3 mi. SE Zephyr, dry, TD 552 ft. in hard sand.

Montague County: Harvey Drilling Co. 1 Whaley, BB&C Sur., 5 mi. NW Bonita, dry, TD 4,600 ft.

Nolan County: Sun Oil Co. and Seaboard 4 B. K. Stone, 100-X-T&P, 3 mi. NE Maryneal, dry, TD 7,043 ft., elev. 2,567 ft.

Palo Pinto County: H. R. Montgomery 1 Neb Watson, 16-2-T&P, 7 mi. NW Palo Pinto, dry, TD 1,246 ft.

Robbie Production Co. 8 Allen-Ritchie, SPRR Sur., 12 mi. NW Graford, dry, TD 1,780 ft.

Shackelford County: G. B. Cree 1 G. R. Davis, 8-13-T&P, 14 mi. E Albany, dry, TD 1,616 ft., elev. 1,799 ft., Sedwick 1,100 ft.

Stephens County: Roland S. Bond 1 R. L. Justice, 44-6-T&P, 6 mi. S Caddo, dry, TD 2,157 ft.

Dalton P. Ellis 1 J. A. Gray, 67-4-T&P, 11 mi. NW Strawn, dry, TD 1,877 ft., sand 1,840-77 ft.

Gray Oil Co. et al., 1 G. E. Langford, 40-6-T&P, 2 mi. NW Frankell, dry, TD 2,250 ft. in shale.

Stonewall County: G. W. Goyce 1 J. D. Smith, H&TC Sur., dry, TD 6,830 ft., Canyon 4,976 ft., Palo Pinto 6,020 ft., Strawn 6,233 ft., Caddo 6,465 ft.

Throckmorton County: John Fidel 1 N. L. B. Davis, TE&L Sur., 7 mi. NE Woodson, dry, TD 4,025 ft., elev. 1,270 ft., Caddo 3,975 ft.

Greenbrier Oil Co. 1 J. W. Tharp, TE&L Sur., 7½ mi. NE Throckmorton, dry, TD 4,969 ft., elev. 1,248 ft., Caddo 4,249 ft.

Wichita County: M. W. Blair 1-A H. F. Harmel, Denton CSL Sur., 1½ mi. N Holliday, dry, TD 1,850 ft.

Fortex Oil Corp. 1 E. M. Horton, BBB&C Sur., 5 mi. SE Burkburnett, dry, TD 1,582 ft.

Wilbarger County: Gray Oil Co. 1-C Waggoner Estate, Geo. Butler Sur., 8 mi. SE Electra, dry, TD 2,426 ft.

Neeld & Hood Drilling Co. 1-A Waggoner, 12-13-H&TC, 4 mi. S Harrold, dry, TD 3,201 ft.

Young County: R. W. Darden 1 Mary Danek, I. Holeman Sur., 3 mi. W Olney, dry, TD 1,276 ft., Gunsight 1,237-42 ft.

R. W. Darden 1 A. E. Klenk, TE&L Sur., 2 mi. W Olney, dry, TD 1,216 ft., Gunsight 1,135-40 ft.

A. R. Dillard 1 W. H. McDavid, T. Addington Sur., 3 mi. N Loving, dry, TD 3,705 ft.

Mid-Continent and Rankin and Pitcock 3 C. B. Daniels, TE&L Sur. 420, 2½ mi. SE Newcastle, dry, TD 4,798 ft., elev. 1,209 ft., Mississippian 4,769 ft.

Netex Oil & Gas Co. 1 R. Ward, TE&L Sur., 3½ mi. NE Newcastle, dry, TD 4,827 ft.

Pure Oil Co. 2 J. K. Jeffrey, TE&L Sur., 6 mi. N Newcastle, dry, TD 5,036 ft., Marble Falls 4,655 ft., Mississippian 4,985 ft.

Oklahoma Fields

(Continued from page 157)

Lincoln County: Coronado Oil Co. 1 Webb, SW SW NW 27-12n-5e, dry, TD 4,175 ft., Pawhuska 625 ft., Belle City 1,882 ft., Hogshooter 2,269 ft., Checkerboard 2,589 ft., Wewoka 2,972 ft., Oswego 3,502 ft., Prue 3,522 ft., Verdigris 3,623 ft., Skinner 3,662 ft., Red Fork 3,807 ft., Inola 3,920 ft., Bartlesville 3,925 ft., Atoka-Mississippian unconformity 4,160 ft.

J. R. McLean and W. O. Allen, Jr., 1 Miller, NW NW NW 17-15n-4e, dry, TD 3,941 ft., Hogshooter 2,883 ft., Layton 2,934 ft., Checkerboard 3,200 ft., Oswego 3,840 ft., Prue 3,900 ft.

Flynn Oil Co. 1 Seiling, SW SW NE 27-16n-3e, dry, TD 4,772 ft., Pawhuska 1,315 ft., Hogshooter 3,100 ft., Layton 3,132 ft., Checkerboard 3,365 ft., Big lime 3,850 ft., Oswego 3,935 ft., Verdigris 4,085 ft., Red Fork 4,276 ft., Mississippian 4,556 ft., Mayes 4,604 ft., Woodford 4,667 ft., Hunton 4,714 ft., Sylvan 4,753 ft.

Logan County: Zephyr Drilling and Alpha Petroleum Co. 1 Tilbury, NW NW NW 28-15n-2w, dry, TD 6,340 ft., Hogshooter 4,752 ft., lower Layton 4,880 ft., Checkerboard 4,972 ft., Jones 5,001 ft., Oswego 5,406 ft., Skinner 5,660 ft., Mississippi lime 5,714 ft., Woodford 5,806 ft., Hunton 5,928 ft., Sylvan 5,948 ft., Viola 6,035 ft., second Wilcox 6,312 ft.

Exploration Oil & Gas 1 Matheson, SW SW NW 32-18n-4w, dry, TD 6,774 ft., Checkerboard 5,566 ft., Cleveland 5,604 ft., Big lime 5,867 ft., Mississippian 6,181 ft., Woodford 6,596 ft., Hunton 6,687 ft.

Deardorf Oil Corp. 1 Youngker, SE SE NE 1-16n-1e, dry, TD 5,200 ft., Checkerboard 3,834 ft., Big lime 4,286 ft., Oswego 4,325 ft., Bartlesville 4,688 ft., Woodford 4,703 ft., Hunton 4,730 ft., Viola 4,902 ft., Wilcox 5,044 ft., second Wilcox 5,170 ft.

McClain County: Hibbert et al., 1 Newbern, SE SE SE 6-5n-1e, dry, TD 6,670 ft., Belle City 3,860 ft., Hogshooter 4,710 ft., Checkerboard 4,920 ft., Woodford 5,790 ft., Hunton 5,830 ft., Sylvan 6,020 ft., Viola 6,160 ft., Wilcox 6,526 ft., second Wilcox 6,581 ft.

McIntosh County: Carter Oil and Phillips Petroleum 1 Graham, NW SE NE 3-9n-16e, dry, TD 5,259 ft., lower Cromwell 4,165 ft., Mississippian Caney 4,218 ft., Mayes 4,488 ft., Woodford 4,620 ft., Misener 4,631 ft., Hunton 4,635 (?) ft., Sylvan 4,792 ft., Viola 4,850 ft.

Muskogee County: D. H. Roe 1 McCullough, NW SE SE 33-14n-19e, dry, TD 2,502 ft., Timber Ridge 1,414 ft., Wilcox 2,192 ft., Bergan sand 2,486 ft., geological test in unnamed pool.

Simmons Royalty Co. 1 Evans-Oakley, SW SE SW 19-15n-18e, dry, TD 2,290 ft., Tiner sand 2,211 ft., Arbuckle 2,260 ft.

Osage County: Peters 1 "Well," SW SW SE 29-24n-6e, dry, TD 2,985 ft., Hogshooter 1,153 ft., Osage Layton 1,163 ft., Layton 1,945 ft., Bartlesville 2,821 ft., Mississippi chat 2,970 ft., Mississippi lime 2,984 ft.

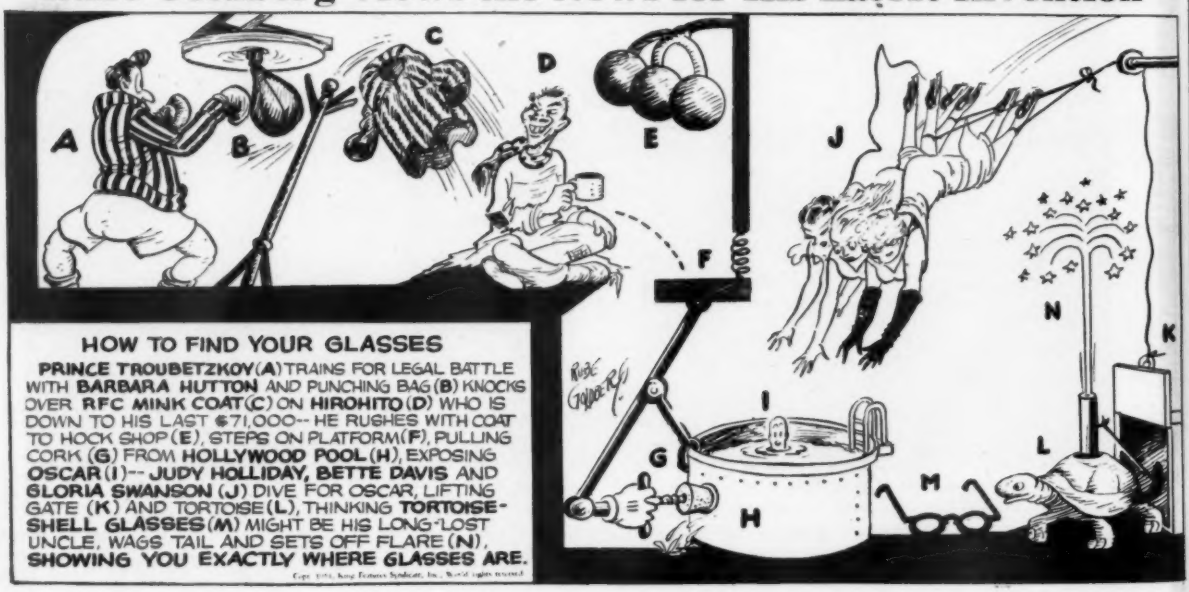
Pawnee County: Krew and Gillespie 1 McIntosh, SW SE NE 28-22n-5e, dry, TD 3,348 ft., Oswego 2,800 ft., lower Skinner 3,126 ft., Mississippi lime 3,340 ft.

Payne County: Wagner 1 Mitchell, NE SW NW 3-20n-2e, dry, TD 4,126 ft., Oswego 3,767 ft., Verdigris 3,944 ft., Red Fork 4,091 ft.

The Texas Co. 1 Norton, SE SE NW 15-18s-4e, dry, TD 4,217 ft., Hogshooter 2,572 ft., Layton 2,592 ft., Checkerboard 2,878 ft., Big lime-Oswego 3,527 ft., Prue 3,398 ft., Verdigris 3,430 ft., Inola 3,686 ft., Bartlesville 3,731 ft., Skinner 3,454 ft., Red Fork 3,607 ft., Mississippi lime 3,843 ft., Misener 4,008 ft., Sylvan 4,002 ft., Viola 4,043 ft., second Wilcox 4,124 ft.

Stephens County: J. E. Crosbie, Inc., 1 Sledge, NE NE SE 22-2s-5w, dry, TD 7,223 ft., Hoxbar 800 (?) ft., Deese 4,160 ft., Tussy 5,325 ft., upper Dornick Hills 5,570 ft., Arbuckle detrital 6,260 ft.

Rube Goldberg Views the News for His Latest Invention



HOW TO FIND YOUR GLASSES

PRINCE TROUBETZKOY (A) TRAINS FOR LEGAL BATTLE WITH **BARBARA HUTTON** AND PUNCHING BAG **(B)** KNOCKS OVER **RFC MINK COAT (C)** ON **HIROHITO (D)** WHO IS DOWN TO HIS LAST $71,000-- HE RUSHES WITH COAT TO HOCK SHOP **(E)**, STEPS ON PLATFORM **(F)**, PULLING CORK **(G)** FROM **HOLLYWOOD POOL (H)**, EXPOSING **OSCAR (I)-- JUDY HOLLIDAY, BETTE DAVIS** AND **GLORIA SWANSON (J)** DIVE FOR OSCAR, LIFTING GATE **(K)** AND TORTOISE **(L)**, THINKING **TORTOISE-SHELL GLASSES (M)** MIGHT BE HIS LONG-LOST UNCLE, WAGS TAIL AND SETS OFF FLARE **(N)**, **SHOWING YOU EXACTLY WHERE GLASSES ARE.**

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EQUIPMENT MEN . . . in the News

Shand & Jurs Opens New Addition to Calif. Plant

Shand & Jurs Co. has announced the opening of a new addition to its Berkeley, Calif., plant and home office. Adjoining its present building, the new two-story addition will provide approximately 12,000 sq. ft. of additional floor space, and represents an investment of about $150,000.

Shand & Jurs entire manufacturing activities are carried on at its Berkeley plant, but factory branch sales offices are maintained at New York, Chicago, Houston, Tulsa, and Los Angeles, with representatives in Seattle, Vancouver, Montreal, Caracas, and Buenos Aires. Whessoe, Ltd., Darlington, England, is licensed to manufacture S & J equipment for distribution in the sterling area, and Horton Steel Works, Ltd., of Fort Erie, Ont., has just recently been appointed as a manufacturing licensee in Canada.

Organized in 1922 by Albert E. Jurs, Sr., and R. C. Shand, Shand & Jurs Co. manufactures and supplies safety, storage, and measuring equipment to the petroleum, petrochemical, and chemical industries. S & J maintains its own engineering department as well as a research and development department.

E. E. Jurs, Shand & Jurs Co.; S. E. Rowden, division engineer, Shell Oil Co., San Francisco; and J. T. Caulkins, Shand & Jurs Co., are shown at opening of Shand & Jurs new Berkeley plant addition.

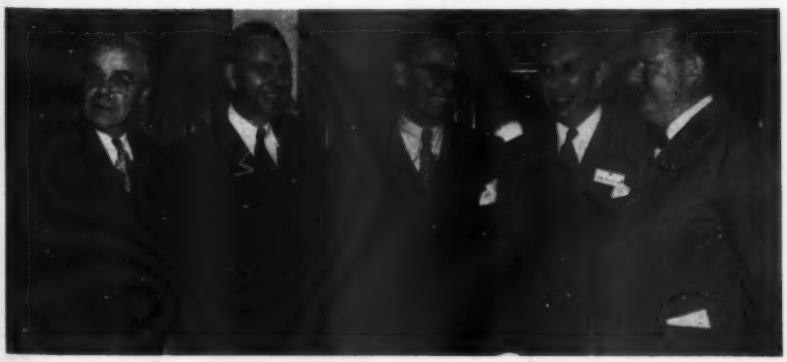
Ryerson Rebuilding and Enlarging St. Louis Plant

Joseph T. Ryerson & Son, Inc., steel distributors, has announced an expansion program at its St. Louis plant which includes reconstruction and new layout of its present plant, and construction of additional warehouse space totaling approximately 50,000 sq. ft. The entire project will be completed before the end of this year. Total warehouse and office space of the enlarged plant will be about 161,000 sq. ft.

The present two-story office building which forms an integral part of the plant, and which utilizes the second floor only for offices, will undergo some changes to provide the additional office space required.

Hilliard Names New Agent

The Hilliard Corp., Elmira, N. Y., manufacturers of Hilco lube, fuel, and industrial oil filters, reclaimers, and purifiers, has announced the appointment of Betz Engineering Sales Co., New Orleans, as a new representative. The firm will cover the territory of Louisiana, Mississippi, and southern Arkansas.



At opening of Shand & Jurs new Berkeley plant addition are: E. L. Kearney, manager, automotive department, Tide Water Associated Oil Co., San Francisco; Oliver Johnson, chief safety engineer, Standard of California; Donald Ross, special agent, Standard of California; R. M. Young, Shand & Jurs; Willie Osborn, president, American Brass & Copper Co., Oakland.

Langley Named to South American Post by Rector

W. C. LANGLEY

L. L. Rector, president of Rector Well Equipment Co., Inc., has announced the appointment of W. C. Langley as South American representative for Rector casing and tubing heads, christmas trees, Rector Fulbore cementing equipment, Rectorseal, and other Rector equipment. Langley, who conducts his own export sales company in South America, will represent Rector in the following countries: Venezuela; Colombia; British, Dutch, and French Guiana; Ecuador; Brazil; Peru; Bolivia; Paraguay; Uruguay; Chile, and Argentina.

Langley has been with the oil industry for 30 years. He began in the oil fields of the Mid-Continent, U. S. A., in 1922. In 1925 he went to Angola, Africa, where he spent 3 years as driller and material superintendent for one of the major companies. Following this, he went to Aruba as material man, then to Trinidad, as a major company agent, and from 1935 to 1938 he was standardization engineer for the same company in Caripito, Venezuela. Langley started his own export sales organization in Trinidad, B. W. I., in 1938. In 1943 he moved his headquarters to Barranquilla, Colombia.

Keim Appointed Chief Engineer at Imperial

The promotion of Charles J. Keim to division chief engineer at Imperial Works, Oil City, Pa., principal manufacturing division of Oil Well Supply Co., has been announced by Alex Quayle, chief engineer for this U. S. Steel subsidiary.

In his new position, Keim will supervise all product design at Imperial Works, including that associated with draw works, drives, rotary tables, swivels, traveling and crown blocks, automatic drilling controls, sucker rods, and pumping units.

Quayle also announced that Charles L. Mohnkern, a design engineer at Imperial Works, has been promoted to engineer in charge of draw-works design, succeeding Keim.

Keim is a graduate of Lehigh University, where he received a B.S. degree in mechanical engineering in 1935. He joined Oilwell that year as a student engineer. After training at

Imperial Works and at Wilson-Snyder Division, Braddock, Pa., he spent the next several years in the engineering department at the Dallas offices and later at Imperial Works. He was appointed a design engineer at the Oil City plant in 1943, and was promoted to engineer in charge of draw-works design in 1948.

Lufkin Foundry Names Bradley to Duncan

Lufkin Foundry & Machine Co., builder of pumping units and gas engines, has announced the appointment of J. D. Bradley, formerly with its Great Bend, Kans., office, as sales and engineering representative for its new office at Duncan, Okla., to serve the southwestern Oklahoma territory.

Bradley has been with Lufkin at Great Bend since 1941. Prior to that time he attended University of Oklahoma.

Pacific Pumps Increase New York Sales Force

Appointment of J. W. McCormick as sales engineer, New York office, has been announced as a promotional transfer, by E. J. Weis, vice president and director of sales of Pacific Pumps, Inc., from the Los Angeles headquarters.

McCormick entered the service of Pacific Pumps in 1941 following his graduation from University of Nebraska. He served successively as engineering draftsman, test and field engineer, and application and design engineer. In 1948 McCormick was appointed sales engineer for Pacific Pumps in the Los Angeles-San Francisco districts.

Jerman Named Sales Supervisor by Rockwell

D. L. JERMAN

M. J. Harper, New York district manager for Rockwell Manufacturing Co., has appointed D. L. Jerman as district supervisor of gas products and Nordstrom valves used in the gas industry.

Jerman joined Rockwell as sales engineer in 1937, after receiving his education at Dean Academy and Columbia University. He has had wide practical experience in the field of gas and chemical process engineering.

Mission Field Men Join in Anniversary Observance

Field sales representatives and company executives in Houston last month in connection with the celebration of Mission Manufacturing Co.'s twenty-fifth anniversary were: (front row) D. J. Ollre, O. K. Ryan, R. L. Creasy, C. L. Turner, Joe Scalise, J. E. Young, J. H. Bannister, C. W. Fryar, Tony Volotko, and E. L. Brown. (Standing) W. T. Campbell, vice president and sales manager; L. M. Roberson; R. L. Faris, export sales; W. O. Calvert; W. C. Underwood, assistant general sales manager; J. H. Meek; T. R. Fullinwider; A. E. Higginbotham; R. E. Hardy; L. L. Roberson; F. S. Mims, Houston city sales manager; A. R. Parker; C. O. Bell, Jr.; I. D. Abshire; M. C. Davis; and D. E. Price. The firm was founded in 1925 as Mission Sales Co. In 1932 the company was reorganized as Mission Manufacturing Co.

Franks Names Rudy, Alexander to New Posts

EARL R. RUDY

T. ALEXANDER

Earl R. Rudy has been appointed district manager of Franks Manufacturing Corp. sales and service branch at Mount Vernon, Ill.

Tommy Alexander has been appointed service manager under District Manager Kenneth Laner at Franks' Odessa branch.

Both men have had extensive experience in Franks' assembly shop, modification shop, and service department.

Cummins Opens New Store at Pharr, Tex.

A new diesel repair shop, the eleventh in a network serving Texas, Louisiana, Oklahoma, and Kansas, has been opened by Cummins Sales & Service, Inc., at Pharr, Tex.

In an announcement on the opening of operations at Pharr, J. E. Everroad, president and general manager of the company, stated that the shop would offer 24-hour service to the valley area.

A new fleet of specially equipped, panel-type trucks has been installed to insure fast and efficient service to the company's customers.

Everroad also announced the appointment of R. G. Barnes, formerly with the company at New Orleans, as district manager at Pharr. Other appointments announced at the same time included J. M. Dickey, Jr., from the Oklahoma City Cummins shop, as parts manager; V. J. Mikell, diesel mechanic from the Houston shop, service mechanic; and Troy L. Weaver as warehouseman.

Marti to Supervise United Operations in Middle East

E. J. Marti has been appointed supervisor of operations for United Geophysical Co. in the Middle East area. Marti has had many years' experience in geophysical exploration both domestic and foreign, and is now stationed at United's headquarters in Kuwait on the Persian Gulf.

Peake With S. D. Day

David W. Peake, representative with S. D. Day Co., Houston, is a graduate of Yale University and formerly was an inspector with Fish Constructors, Inc. Day is agent for Ruberoid pipe-line felt, Pittsburgh Coke & Chemical Co. coal-tar enamels, O. K. Glass pipe wrap, and other pipe-line specialties.

(Continued on page 174)

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EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

BUCYRUS CABLE Tool Spudder 36-L 1948 Model, perfect condition, 54 foot mast, dual cathead, dual pneumatic tired wheels. All tools from 24", all accessories. An-Son Petroleum Corp., First National Bldg., Oklahoma City, Okla. Phone 7-4497.

FOR SALE: 24 tank car shells. Sizes ranging from 6' 6" x 25' 4" ¼" top ⅜" bottom plate single riveted, to 6' 4" x 32' 8" ⅜" top ⅞" bottom plate double riveted. 6 with 18" bolted man hole end. All in number one condition. Price $800.00 each loaded on either car or trucks. M. J. Regan, Coffeyville, Kans.

NEW 30" O.D. PIPE
10,000 ft. 30" O.D. x .344 Wall, Electric weld, Sub-standard 100# Test, 40' DRL, small percentage shorter lengths, Plain Ends beveled. Located—Houston, Texas.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 Tulsa, Okla.

FOR SALE NOW—DELIVERY IN 30 DAYS
Used 7000' String
7" O.D.—26#-N-80-Casing
Mill-tested 5500# per square inch, six months old.

Box D-936
The Oil & Gas Journal, Tulsa, Oklahoma

FOR SALE
SEAMLESS OIL WELL CASING AND TUBING

2800' Used H-40 5½" O.D. 14# 8 R.T., R.2
3500' Used J-55 5½" O.D., 15½# 8 R.T., R.2
Above two items 6 months old, stencils showing, Thread protectors loaded one car, FOB Mt. Pleasant, Michigan
2600' A-1 Used H-40 5½" O.D. 14# 8 R.T., R.2
900' A-1 Used H-40 5½" O.D., 14# 8 R.T., R.1
FOB Central Michigan
7000' A-1 Used J-55 5½" O.D. 15½# 8 R.T., R.2
FOB Central Michigan
1400' A-1 Used 10¾" O.D., 41.85# Drive Pipe, 8 V.T., R.1
FOB Central Michigan
6100' New J-55 2⅞" O.D. 6.50# External Upset tubing, 8 R.T., R.1 & 2
FOB N. Central Ohio
3300' A-1 Used J-55 3½" O.D. 9.30# Ext. Upset., 8 R.T., R.2
3100' A-1 Used J-55 4½" O.D. 12.75# External Upset., 8 R.T., R.2
FOB Central Michigan
3000' A-1 Used 8⅝" O.D., 24# 8 R.T., FOB N. Central Ohio

MICHIGAN CARLON PIPE CO.
20120 Livernois Detroit 21, Michigan
DIamond 1-1400

EQUIPMENT FOR SALE

FOR SALE: Used Drilling Equipment—1—L. R. O. Waukesha Motor mounted on skids with Clutch and Drive Pulleys and Steel Housing; 1—6 x 12 Wilson Snyder Pump powered with 1—L90 A.C. Motor with starting motor. All equipment A-1 Shape. Telephone 1227—Wampler Bros., Longview, Texas.

AVAILABLE for sale and immediate shipment line pipe, seamless and lapweld casing, tanks. Call or write Edco Pipe & Supply Company, Box 565, Drumright, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

2,000 Feet

NEW STEEL PIPE

26" O.D.
.281 wall—40 foot lengths
Electric Weld
Immediate Delivery
Subject to prior sale
Write—Wire—Phone

Sonken-Galamba Corp.
2nd and Riverview (X-691)
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Order Now—Immediate Delivery!

SEAMLESS TUBING—EXCELLENT FOR GAS, OIL, WATER FLOW LINES

Quantity	Size	Approx. wall	Description
110,000'	1½" O.D.	.140"	Recond. Seamless Tubing, P.E., 14' & Over.
30,000'	2" O.D.	.145"	2.7# Recond. Seamless Tubing, P.E., 14' & Over.
20,000'	2¼" O.D.	.140"	Recond. Seamless, P.E., 14' & Over.
30,000'	2½" O.D.	.145"	3.6# Recond. Seamless Tubing, 14' & Over.
15,000'	3" O.D.	.300/.375"	New 9.7# Seamless Tubing, P.E., 23'-26' Lgths.
100,000'	4" O.D.	.140/.160"	Recond. Seamless, P.E., 14' & Over.
7,000'	6⅝" O.D.	. . . . .	18.97# Good Grade Used Lapweld, Cleaned, Beveled Ends, 20' Random Mill Lengths.

TUBING & CASING

30,000'	2⅜" O.D.	. . . . .	4# Good Used Lapweld Range 1 Tubing with New 11½ V-Threads and Collars.
3,500'	5½" O.D.	. . . .	15½# Good Used Lapweld T&C Range 1 Casing.
5,000'	7" O.D	. . . .	20# Good Used Lapweld Range 1 T&C Casing, 11½ V-Threads.
2,000'	8⅝" O.D.	. . . .	25# Good Recond. Casing, T&C, 8 V-Threads Range 1.
1,200'	10¾" O.D.	. . . .	32.75# Good Used Lapweld T&C Casing, Range 1 New 8 Rd. Thds. & 8" Long Collars.

THIS MATERIAL IS AVAILABLE FOR IMMEDIATE SHIPMENT, SUBJECT TO PRIOR SALE.

OTHER SIZES OF LINE PIPE, SEAMLESS TUBING IN SUITABLE SUBSTITUTE SIZES FOR STANDARD PIPE (EXCELLENT FOR GAS, GATHERING AND FLOW LINES), CASING AND TUBING AVAILABLE FOR IMMEDIATE DELIVERY.

FOR FURTHER INFORMATION, WIRE OR PHONE AT ONCE

A. J. STRUBEL, Broker

SIDney 1791 (Day Phone) HUDson 8152 (Night Phone) 4946 Murdoch, St. Louis, Mo.

EQUIPMENT FOR SALE

FOR SALE: IDEAL SLUSH PUMP
Model C-150
Melton Supply Co., Seminole, Okla.

FOR SALE: 17½" Oilbath Gumbo Buster Rotary Table. 2—6" Gumbo Buster Swivels. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Two Sullivan 37 special rigs mounted on International trucks, Waukesha and Buda drill motors, 1800 ft. Sullivan 2⅜ tool joint pipe 20 ft., two 900 gallon water tanks mounted on late model Chevrolet trucks, two 4 wheel rod trailers, two 260 gallon gasoline trailers. Equipment in top shape, used less than two years. Nothing additional needed to start drilling. Good supply extra parts. TRANS-TEX EXPLORATION CO. Box 558, Abilene, Texas. Phones 6130—2-7565.

FOR SALE: DRILLING MAST
1—96' Lee C. Moore Cantilever Drilling Mast. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Galvanized Iron Pipe, diameters 1½" through 3" length 30" through 88" threaded for fill pipes or suction stubs for Gasoline Tanks. Armco Drainage & Metal Products, Inc., P. O. Box 1343, Atlanta 1. Georgia.

FOR SALE: 3500' of used 4½ drill pipe with 5¾" O.D. full hole tool joints. Melton Supply Company, Seminole, Oklahoma.

FOR SALE: Three 1946 F. W. D. (4 Wheel Drive) Tractors. All in good condition. Low mileage. One having only 7,622 miles. Will sell cheap and will deliver. Write Heintzelman's, Inc., Box 3071, Orlando, Florida, or phone "Bob" at 3-3477 collect, Orlando, Florida.

FOR SALE: 40 H.P. Bettis steamer, Tanks and steamer cab, Tools, Conns, Steam hose. On 1948 2-Ton Chevrolet truck. Price $3500.00. Frank Jones, McPherson, Kansas.

GAS COMPRESSORS
90 HP Direct Driven Superiors. Extra cylinders, 80 HP C & G Coopers. Location Oklahoma. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

7¼ x 12 USED Slush Pump. Large Single Drum Cardwell, Used Swabbing Machine. Traveling Blocks & Hooks. Buda JL-1335 Gas Engine. General Equipment Co., 815 Daniel Bldg., Tulsa.

FOR SALE: Emsco JC 1250 sand reel, complete with substructure, 9500' of ⅝" wire line, in good condition, and complete Fawick air clutch. Assembly available for inspection by contacting Oil States Drilling Company, Box 1708, Big Spring, Texas, phone 2290-W. Price, $4250.00.

FOR SALE: Four ZC 503 & One ZC 208 used F & M Engines, good condition. Want good 2" or 2½" line pipe or tubing. Sell, buy or trade. Call, wire or write A. M. Moore, McCamey, Texas.

NEW 100 HP General Motors Diesel V-belted to 5x10 Wheatley Mud Pump, unit on skids. 1949 invoices total $6,800.00, now higher. Will take $6,500.00 FOB Coleman, Texas. Never pumped a gallon. O. B. Siler, Logansport, La.

FOR SALE: Model 32 Special Walker-Neer spudder in A 1 condition. If interested call or write I. Weiner, P. O. Box 1224, Big Spring, Texas, or phone 1438, Big Spring, Texas.

Welded Stock Tanks
(Save 25%)
100 Barrel to 300 Barrel inclusive, manufactured to A.P.I. Specs., available immediate delivery.

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EQUIPMENT FOR SALE

1—"OILWELL" Gas Booster Unit with size 6" x 11" TB Single Stage Compressor Complete with Bottom Discharge and Top Suction on the Cylinder, 57" PD 7-D Groove V-Belt Type Flywheel Pulley, Force Feed Cylinder Lubricator, Lubricated and Vented Metallic Packing, #8000 Gas Engine Cooler, one 14.2" PD 7-D Groove Pulley for Engine, Seven D-240 V-Belts, one 12 volt Storage Battery 140-170 A.H., Gauges for intake and discharge Gas Pressure, Thermometers for Water Cooling System, Necessary Piping and Fittings for Cooling Gas System and Gas supply to Engine, all assembled on Structural Steel Base with Waukesha Model 145 Gku 6-Cylinder Power Unit 5¼" x 6" Engine specially equipped for Gas Compressor Drive complete with: Air Cleaner—Oil Bath Type, Base Type Oil Pan, Natural Gas Carburetor, Water Pump, Bypass Thermostat, Filter-Lubricating Oil, Governor, Safety Magneto, Water Cooled Exhaust Manifold, Lubricator—Top Cylinder, Oil Pressure and Gas Pressure Gauge, Penn Safety Switches—High Water Temperature and Oil Pressure and Friction Throttle Control, Electric Starting—12 Volt and Twin Disc Clutch Power Take-Off. This outfit has been used a very short time and is in first class condition, complete with steel house, valves, fittings, gas cooler and pipes. Has been pumping ¾ million feet of gas per day against 400 lb. line pressure. $8000.00 F.O.B. Consumers Natural Gas Co., Box 669, Pikeville, Kentucky.

I OFFER 1,000,000 gallons lubricating oil ready to use, 80c per gal. Can pay cash 40c per gal. Balance long terms. John Stouppas, 175 E. Long St., Columbus, Ohio.

NEW Double Drum Well Servicing Unit Double Pole, 140 Hp. Waukesha. Fully Equipped. Box D-940, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 11,000 feet of 4" O.D. seamless tubing, random lengths, good, ready for line. Davis Construction Co., Parkville, Missouri. Phone 4051.

11,500 GAL. 200 lb. pres. U201 propane tank. 25,000 gal. 75 lb. pres. butane tank. L. M. Stanhope, Rosemont, Pa.

FOR SALE: E.L.T. M-6-W Rotary Water well drill mounted on 46 Studebaker truck equipped with chain pull downs, complete set of tools and bits and 600 feet of 3½" Acme Thread drill pipe. For particulars write Route 4, Box 362, Amarillo, Texas, or call 312, Hereford, Texas.

FOR SALE: Two 12", 3000# WP, QRC Blowout Preventers. Used but like new, $9,000.00 for both. Lum Price, 417 E. 16th, Houston, Texas. Phone UNderwood 8945.

USED DRILLING AND PRODUCTION EQUIPMENT. GENERAL EQUIPMENT CO., 815 DANIEL BLDG. PHONE 2-6272, TULSA.

EQUIPMENT WANTED

WANTED: GAK Waukesha Motor, does not need to be in A-1 condition. Also, set of hydraulic jacks and rings for pulling casing. Crest Drilling Co., Petroleum Building, Wichita, Kansas.

WANTED: Used spudder, either Bucyrus 33-W, or 24-L or Ideco No. 16, with or without tools. State age, condition, location, and price and inventory of tools if any in first letter. R. E. Skinner, P. O. Box 2939, Tampa, Florida.

WANT Buy 9 Field Tanks 20,000 to 80,000 Bbl. Cap. Darien Corp., 60 E. 42nd St., N.Y., N.Y.

HELP WANTED

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

GEOPHYSICAL SURVEYOR: Minimum two years' experience on transit; do not apply otherwise. Box D-921, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Petroleum Engineer, by Independent Geological Firm, familiar with Secondary Recovery and experienced in making appraisal reports. In applying please give detailed experience and salary expected. Interest participation if qualified. Box D-942, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

ELECTRICAL Engineer with crude oil pipe line experience. Familiar with design of electric pump stations, auxiliary electric machinery and equipment, remote control circuits, power sub-station and distribution circuits for installations up to 5,000 horsepower. Familiarity with communication circuits and electronic equipment also required. Include full professional and personal details first letter. Box D-933, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: College graduate, three or more years' experience in petroleum refining, for technical sales in established line of chemical products used by petroleum industry. Locations—Gulf Coast Area, West Coast. Letter should include details of education and experience, family and military status, salary expected and recent photo. State geographical preference. Box D-939, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Associate or full professor of Petroleum Engineering in a leading institution. Must have successful professional and research background. Work to begin September fifteenth. Box D-897, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST qualified for geological work in connection with reservoir engineering. Five years experience necessary. Experience in Permian Basin desirable. Box D-857, The Oil and Gas Journal, Tulsa, Oklahoma.

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We need men with experience for jobs now open on seismograph crews as

PARTY CHIEF
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Permanent jobs at good salary.

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ENGINEERS

Process (Chemical) Engineers
Construction Engineers
Project (Mechanical) Engineers

To Work On
Petroleum, Petro-Chemical and Chemical Projects

Write in complete detail, giving positions held, references, education, salary expected. Personal interview can be arranged.

Address Personnel Department

E. B. BADGER
& SONS COMPANY
75 Pitts St., Boston, Mass.

HELP WANTED

GEOPHYSICIST: Fully qualified and experienced for position of Chief Geophysicist with well-known contracting company. Application must state complete qualifications, references and salary expected. Box D-918, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH PARTY CHIEF and Computer wanted by new aggressive company. Box D-920, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

SUPERINTENDENT experienced in Petroleum Production, drilling and work-over jobs. Excellent opportunity with Independent Oil Producing Company. Please state age, experience, and give reference with first reply. Box D-913, The Oil and Gas Journal, Tulsa, Oklahoma.

CHIEF Geophysicist for Venezuelan assignment. Must be proficient in handling seismic, gravity, torsion balance, magnetic and other data. Should have college degree in geology and/or geophysics plus active experience in geophysics. Give full details in reply to P. O. Box 2819, Dallas, Texas.

WANTED: LAND MAN
Thoroughly experienced in Oklahoma Oil Fields. Box D-935, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

QUALIFIED GREASE and LUBE OIL PROCESSING MAN desires change. Fifteen years of successful plant management; experienced in latest types of lubricants. Location unimportant if opportunity present. Box D-914, The Oil and Gas Journal, Tulsa, Oklahoma.

CONSTRUCTION ENGINEER or Superintendent R.P.E. 30 years' experience refinery and general construction. Prefer large contractor operating in oil or defense construction. Mid-Continent or Southern area. Box D-922, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE CHEMIST: Ten years successful Laboratory Technical, Supervisory experience, for Major oil company. Family's health necessitates change. Prefer Rocky Mountain Area. Available one month. Box D-934, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM and Gas Chemist, B.S., 14 years experience, married, 38 years old, wants position Dallas, Texas, only. Member A.C.S. and A.S.T.M. Excellent references. Box D-944, The Oil and Gas Journal, Tulsa, Okla.

PRODUCTION ENGINEER: Age 29, Graduate Petroleum Engineer, University of Texas. Four years varied experience—production, drilling and work-over in Mid-Continent and Gulf Coast Areas. Desires connection with active independent or drilling contractor. Applicant has substantial geological and reservoir engineering background. Box D-943, The Oil and Gas Journal, Tulsa, Oklahoma.

RESERVOIR and Evaluation Engineer: B.S. Petroleum Engineering, University of Pittsburgh, 1940. Capable of complete studies. Some production experience. Prefer position with reputable independent. Domestic. Now employed in Houston. Box D-941, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

COMBINATION PRODUCTION and Drilling Superintendent, age 40, Graduate Engineer with 18 years experience in the Mid-Continent, Gulf Coast and Permian Basin areas desires connection with substantial independent or drilling contractor. Applicant is thoroughly reliable, sober, and has reputation as a good well man at all depths. Applicant has also had considerable experience as evaluation engineer and has experience on drilling block trades, screening deals for the management, and in bidding in drilling contracts. Now employed. Salary open. Box D-930, The Oil and Gas Journal, Tulsa, Oklahoma.

DRILLING and Production Superintendent: More than 25 years experience with one employer, in drilling, well completion and production operations principally in Kansas, Oklahoma and West Texas. Best of references. Immediately available. Box D-919, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Geologist, with major company experience in Permian Basin. Am interested in contacting an active independent in this area. Available immediately. Box 1826, Midland, Texas.

GEOPHYSICIST 15 years experience available July seeks permanent location supervising interpreting reviewing seismic gravity magnetics in Caribbean Area, Brazil, Mexico, Peru. Box D-937, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box D-938, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Graduate engineer with fourteen years' excellent experience desires to change employment. Interested in production engineering in Mid-Continent or Gulf Coast states. Box D-927, The Oil and Gas Journal, Tulsa, Okla.

GRADUATE PETROLEUM ENGINEER: 4 years experience in drilling and work-over desires employment in Mid-Continent area. 27 years old, single, non-reservist. Box D-916, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN AVAILABLE

WEST TEXAS—NEW MEXICO AREA

Has limited time available to represent two or three small oil companies, royalty companies, or independent operators, or group of investors in buying leases, royalties, or taking drilling blocks—either on a retainer or regular commission basis. Have abstract and title experience, and a reputation of fair dealing. Twenty-five years experience in all phases of oil industry. Am well established with permanent West Texas office headquarters and late model car. Have good connections and keep abreast of new buying trends in the area. Very successful in 1950. Personal interview desired; bank references exchanged. Inquiries invited. Write or Wire:

P. O. BOX 1032, Lubbock, Texas

SITUATIONS WANTED

F. C. C. ELECTRONICS ENGINEER: 12 yrs. experience, age 34, veteran, family, desires Communications Supervisory Position Oklahoma area. Box D-917, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, Drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

ONE-FOURTH interest 80 acres with new well. Produced over 22,000 bbl., 90 days. Price $12,500 for 1/16—no proration. Box D-926, The Oil and Gas Journal, Tulsa, Oklahoma.

COLORADO Oil-Gas Leases: Lincoln County, 10,000 acres; Kiowa County, 15,000 acres; Crowley County, 15,000 acres. All or part for sale at $1.00/acre (Renewal-$0.50/acre). For Sale: Ranch land with oil possibilities. E. H. Grantham, Realtor, Ordway, Colorado.

28,000-ACRE block of Oil and Gas leases. Interested in turning for small overriding agreement or cash. Lloyd J. Twibell, Orchard, Nebraska.

LARGE INDEPENDENT wants properties to repressure. Give full details and price for quick action. Box D-925, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION OIL MEN: Oil lease on 640 acres sections 13-14-24-23, Twp. 35, Range 77, located on North Cole Creek Field. Fee land, ¾ mile producing wells. Will accept bids for drilling commitment. Surrounded on three sides by oil wells. Marvin Smith, J. B. Smith, 601 East 3rd St., Cheyenne, Wyoming.

IDEAL drilling block 1171 A in Shelby Co. Texas surrounded by Major Co. Holdings both shallow and deep prospects consider drilling deal or cash. C. A. Parker, Center Texas.

INVESTORS, BROKERS: Leases $2.00/acre up. Royalty $10.00/acre up. Active and profits 5 to 50 for one. Stands investigation. References. E. M. Adams, Marshall, Texas.

HAVE GOOD drilling deal in Sumner County. Structure covers about 1,000 acres; never seismographed, surface geology looks good. Write: George Peck, Caldwell, Kansas.

ACTIVE N.M. OIL AREAS

We recommend to buyers leases & royalty located in Major Oil Co.; seismograph blocks, where deep wells are projected in S. Roosevelt, N. Lea & Chaves County, New Mexico. Details these potential oilfields on request.

W. J. PETERMAN, Geologist
Portales, New Mexico

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

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Corpus Christi, Texas

API Pipe Threading With Latest Landis Machines

LEASE AND DRILLING BLOCKS

PLANNING to develop a partly proven oil-gas field in Allegany County, N. Y. Interest may be had for cash or good used casing, drive pipe and well equipment. If interested, write for details. C. N. Wilber, Box 625, Westfield, Pa.

SACRIFICE for immediate cash, 7½ per cent, 4 wells, $30,500, marvelous potential; Alberta. Write today. Box D-945, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS OPPORTUNITIES

WELL ESTABLISHED British oil equipment and supply company with head office in London is interested in acting as European and Sterling Area sales representative for all classes of equipment and supplies connected with the oil and mining industries. Box D-886, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418. 815-15th Street, N.W., Washington 5, D. C.

ROYALTIES

SPOT CASH PAID FOR PRODUCING ROYALTY. SMALL TO LARGEST BLOCKS IN SETTLED OR OLD PRODUCTION ONLY. Oil Specialists since 1934. GERBER & CO., 120 WALL STREET, NEW YORK.

OVERRIDING Royalty of from 1% to 2½% on 2800 acres, on good structure of two fields in western Wyoming. Bargain price for all. R. O. Barnsley, 950 Lincoln Ave., Palo Alto, California.

WE will buy your producing override royalties and oil payments, no matter how small. Emray Oil Co., B. R. Irwin, President, 1045 Electric Bldg., Houston, Texas. Phone—Charter 3479.

DEEDED ROYALTIES

San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington New Mexico.

MONTANA ROYALTIES

Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

PRIVATE PARTY wants to invest up to $150,000.00 in producing royalties or settled production. Small or large deals considered. Box D-912, The Oil and Gas Journal, Tulsa, Oklahoma.

PECOS COUNTY ROYALTY FOR SALE

Under drilling block, now drilling. Have encountered two shallow pays. $60.00 per acre.

ALBERT E. WALKER
504 Hamilton Bldg., Wichita Falls, Texas

EQUIPMENT MEN

(Continued from page 170)

Westinghouse Awarded Pipe Line Contract

Plantation Pipe Line Co., operator of one of the world's largest pipe lines for refined-petroleum products, has awarded a $600,000 contract to Westinghouse Electric Corp. for electrical equipment necessary for the expansion of the system.

The contract provides for switchgear, motor starters, control centers, and ventilating fans. The additional equipment and pipe line will boost the capacity of the system from approximately 100,000 to 167,000 bbl. per day.

The original pipe line, consisting of 12 and 10-in. pipe from Baton Rouge, La., to Grennsboro, N. C., with lateral lines to Birmingham, Ala., Columbus and Macon, Ga., and Knoxville, Tenn., was constructed in 1941.

Woodruff is Made Pump Division Manager

Fairbanks, Morse & Co., Chicago manufacturer, has announced the advancement of T. E. Woodruff from assistant manager to manager of the Pump Division with headquarters in Chicago. He succeeds D. T. Johnstone who assumes the duties of pump department manager of the company's San Francisco branch house.

Woodruff has been associated with Fairbanks-Morse since 1912. He was graduated in 1926 from Iowa State College with the degree of bachelor of science, civil engineering. He was for several years manager of the pump department in the company's St. Louis branch, and for the past year and a half has been assistant manager of the pump division, which position he held until his recent promotion.

Cessna Completes Large Plant Expansion Program

The Cessna Aircraft Co. of Wichita, Kans., has just completed a large expansion program at its three plants, resulting in an over-all addition of 47 per cent more manufacturing space.

Dwane L. Wallace, president of Cessna, in announcing the over-all completion said: "In the past 10 years Cessna has invested over $8,000,000 to improve and expand its plants and equipment."

Largest expansion was at the recently purchased Prospect plant southwest of Wichita. There Cessna bought, completely modernized, and reactivated 160,000 sq. ft. of floor space.

The Hutchinson, Kans., plant has been expanded by 25,000 sq. ft. giving it a total of 135,000 sq. ft. of manufacturing floor space.

A large new wing 750 ft. long has been added on the east side of the main plant in Wichita. The new wing has 75,000 sq. ft.

Roots-Connersville Elects New President

Robert H. Owens has been elected president and general manager of Roots-Connersville Blower Corp., succeeding John Avery, recently deceased.

Owens, a graduate of Purdue University, joined the engineering staff of P. H. & F. M. Roots Co., a predecessor of Roots - Connersville, in 1925. Prior to joining Roots, he was actively connected with the development of the centrifugal line of blowers built by R-C.

In 1946, Owens was named vice president in charge of engineering and manufacturing, and in 1948 he was elected to the board of directors.

BS&B Names Simms Director Of Welding Development

The appointment of Howard N. Simms as director of welding development and quality control of Black, Sivalls & Bryson, Inc., has been announced by Kenneth W. Lineberry, president. Simms will be responsible for the supervision of welding methods and procedures, and the establishment and maintenance of quality control of all welded products.

Simms has been associated with Black, Sivalls & Bryson since 1936, and is widely recognized as an authority in the field of welding operations.

American Meter Names New Plant Manager at Los Angeles

American Meter Co. has announced the appointment of George W. Stevenson as manager of its Los Angeles factory.

Stevenson joined the San Francisco branch of American Meter in 1928. He was transferred to the Los Angeles office in the capacity of sales engineer. He was later appointed assistant manager of the Los Angeles office, and served in that capacity until his recent promotion.

Young Radiator Products Now Available in Canada

Certain selected types of heat-transfer products of Young Radiator Co., Racine, Wis., and Mattoon, Ill., are now being manufactured in Canada under special license arrangements granted James B. Carter, Ltd., Winnipeg. The announcement was made jointly by Fred M. Young, president of Young Radiator, and J. B. Carter, president of the Canadian firm.

Carter has been granted manufacturing privileges to certain Young designs and engineering specifications and will produce heat-transfer units exclusively for the Canadian market.

Appalachian Fields

(Continued from page 163)

5,277 ft., 5,289 ft., and 5,294 ft. All gas now tests 3,009,000 cu. ft. and has been turned in the line. The well is shut down at 5,294 ft. but may be drilled still deeper. In Ravenswood district, Jackson County, D. D. Foster 1 Wilmer Taylor resulted in a good oil well with an initial production of 50 bbl. per day from the Berea sand. Total depth is 2,150 ft.

OHIO

COLUMBUS.—J. C. Steiner stepped out ⅝ mile north of the old field in Lake Township of Stark County, and brought in a small well on Abe Troyer in Section 22. Red Clinton and White, topped at 4,475-4,537 ft., gaged 320,000 cu. ft. natural and 400,000 cu. ft. with 1,320 psi. pressure when shut in after shot. Operator has moved his rig 1½ miles to the northwest for another test on Jonathan King in Section 16.

Oxford Oil Co. 3 T. C. Ramsey, Section 15, Killbuck Township, Holmes County, came in with an oil showing and 120,000 cu. ft. of gas in the lower Clinton, logged at 3,395-3,449 ft. The test was shot with 90 qt. and made 60 bbl. and 100,000 cu. ft. of gas in 24 hours.

J. A. Upham failed to fish out a lost string of tools on 1 Mary Cole in Lot 20, Goshen Township, Tuscarawas County, and plugged hole. White Clinton was topped at 5,416 ft. and tools were lost at 5,427 ft. with the gas gaging 130,000 cu. ft. at that point.

Ohio Fuel Gas Co. drilled in a good well on Ralph R. Shilling, Section 7, Canaan Township, Wayne County. Lower Clinton at 3,021-30 ft. gaged 3,340,000 cu. ft. of gas natural.

Stone Creek Brick Co. 1 Marsh Lumber, Lot 30, Jefferson Township, Tuscarawas County, opens up a new Berea pool. Sand was topped at 858 ft. and drilled in 30 ft. with a total open flow of 1,500,000 cu. ft. of gas natural.

Locations reported for the week totaled 17, while wells completed also totaled 17.

OHIO UNSUCCESSFUL WILDCAT

Medina County, Litchfield Township: Ohio Fuel Gas Co. 1 Louis Psota, Lot 10, Clinton, TD 2,780 ft.

Western Kentucky

(Continued from page 162)

WESTERN KENTUCKY WILDCAT FAILURES

Daviess County: W. K. Snyder 1 Camp, N½ SE SW NW 24-O-31, dry, TD 1,532 ft. F. M. Ashby 1 Hamilton, NW SE NE NW 15-O-32, dry, TD 976 ft.

Hancock County: D. E. Schock 1 Newman Minerals, W½ NW NW NE 5-P-34, dry, TD 860 ft.

Henderson County: Buchman & O'Neal and Walter Duncan 1 Staples, S½ SW NW NE 2-O-26, dry, TD 2,252 ft.

National Associated Petroleum Co. 1 Blair, SE SW SE SW 19-Q-25, dry, TD 2,398 ft.

EASTERN KENTUCKY

ASHLAND.—In Wolfe County and 5 miles south of Campton, the county seat, Roy Davis et al were having trouble with water at their 1 Sherman Bradley wildcat. Corniferous lime topped at 1,343 ft. had oil pay from 1,376-81 ft., total depth, with a fill up of 500 ft. of oil in 35 minutes. However, upon acidization well is making considerable water along with oil and operators are attempting to shut off water.

In Big Sandy gas field, Pike County sector, United Fuel Gas Co. 2 J. C. Stratton was initialed for 267,000 cu. ft. of gas daily from Maxon sand at 1,949-2,026 ft., total depth, with rock pressure of 400 psi. The same company's 6514 S. N. Stacey et al, in Knott County sector, made 73,000 cu. ft. of gas daily from Devonian black shale at 2,766-3,279 ft., total depth, with rock pressure of 370 psi.

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Texas Gulf Coast

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Brazoria County: Magnolia Petroleum Co. 1 Griffith, J. B. Bailey League A-38, 2 mi. NE West Columbia, dry, TD 11,597 ft.

Calhoun County: Falcon Seaboard Drilling Co. P-2 Maude B. Taylor, Phillip Dimmit Sur. A-11, dry, TD 8,512 ft.

Goliad County: H. R. Smith-Edwin L. Cox-Hawn Bros. 1 A. Coutret, Jr., Maria de Jesus Y'Barvo Sur., dry, TD 4,483 ft.

Harris County: John W. Mecom 1 Hamblin est., Mary Owens Sur. A-405, dry, TD 8,262 ft.

Karnes County: McCarrick Oil Co. 1 O. A. Mudd, Carlos Martinez gt. A-6, dry, TD 2,529 ft.

Live Oak County: D. E. Clark and A. A. Moore 5 J. I. Hailey, P. Miller Sur. A-277, dry, TD 4,875 ft.

Montgomery County: W. R. Godsey 1 Cabill hrs., William Seir Sur., dry, TD 3,806 ft.

Orange County: William Herbert Hunt 1 Loupe, John Jett Sur. A-15, 7 mi. SW of Orange, dry, TD 8,200 ft.

Victoria County: Robert Riesenberg, Tr. 1 John and E. L. Obsta, Raphael Rios Sur. A-283, dry, TD 5,023 ft.

Waller County: Sun Oil Co. 1 Connell, David Scott Sur., 12 mi. NE Hempstead, dry, TD 12,143 ft.

Wharton County: Smith & Smith 1 Harfst, Lyman-Conkrite Sur. A-16, dry, TD 5,111 ft.

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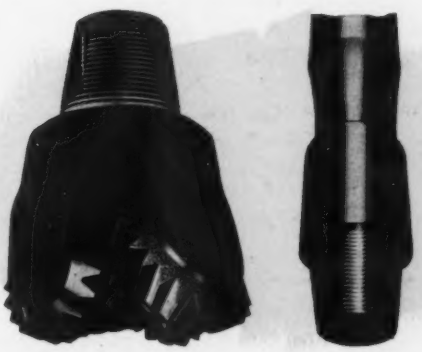

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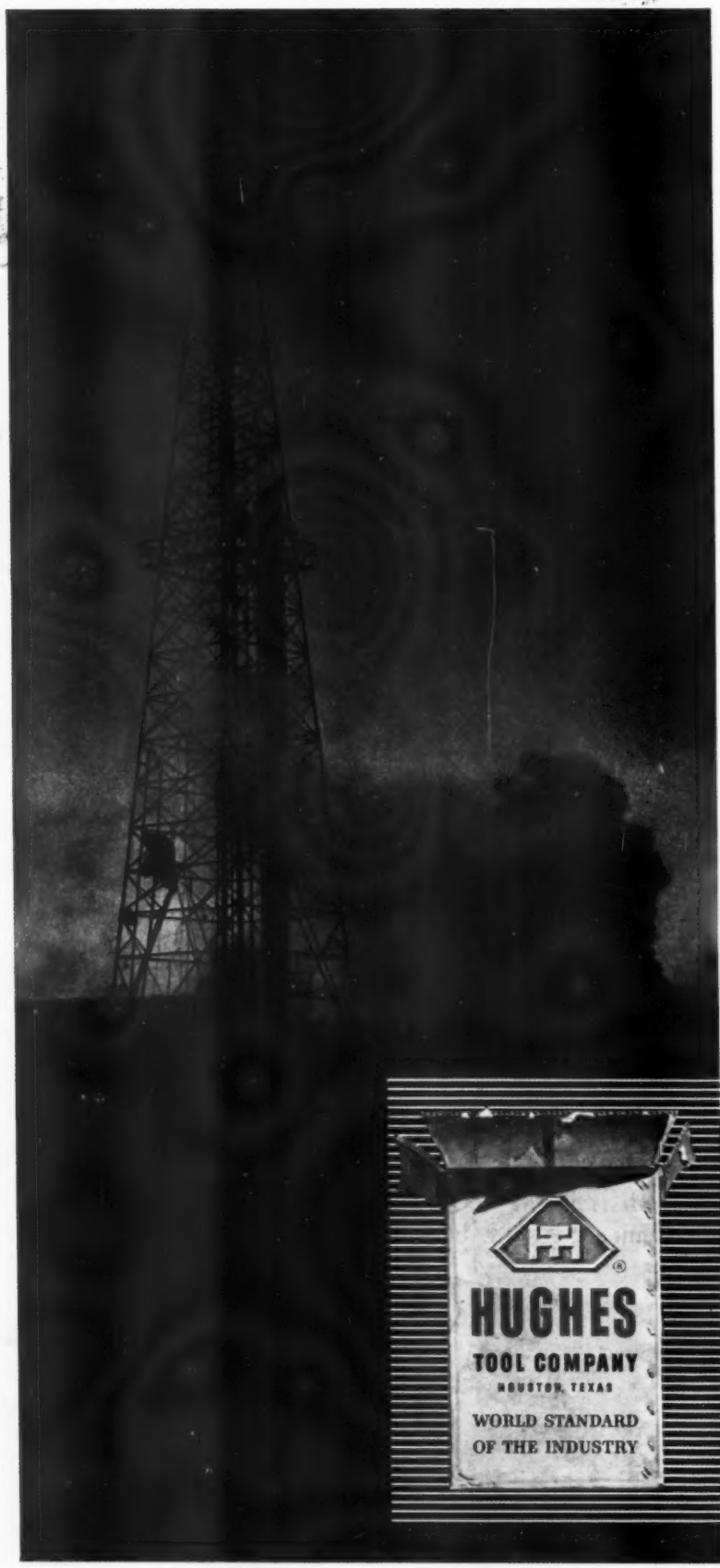

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